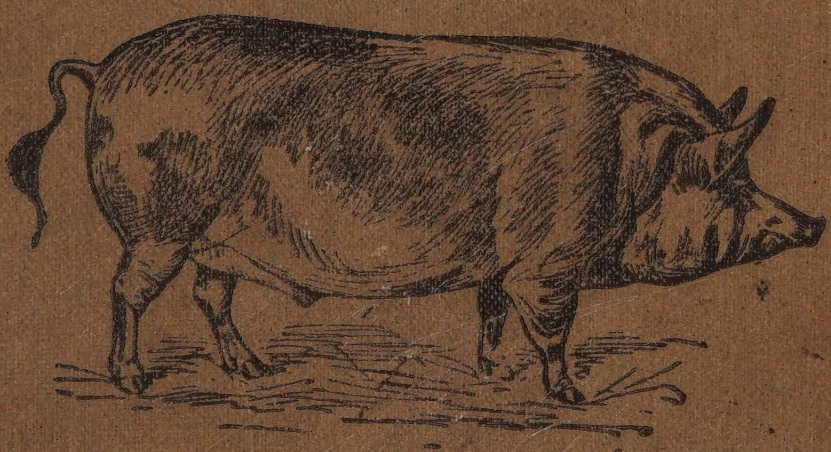
PIGS, PIGSTIES, AND PORK

By *G. Mayall*



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PIGS, PIGSTIES, AND PORK

Plate I.

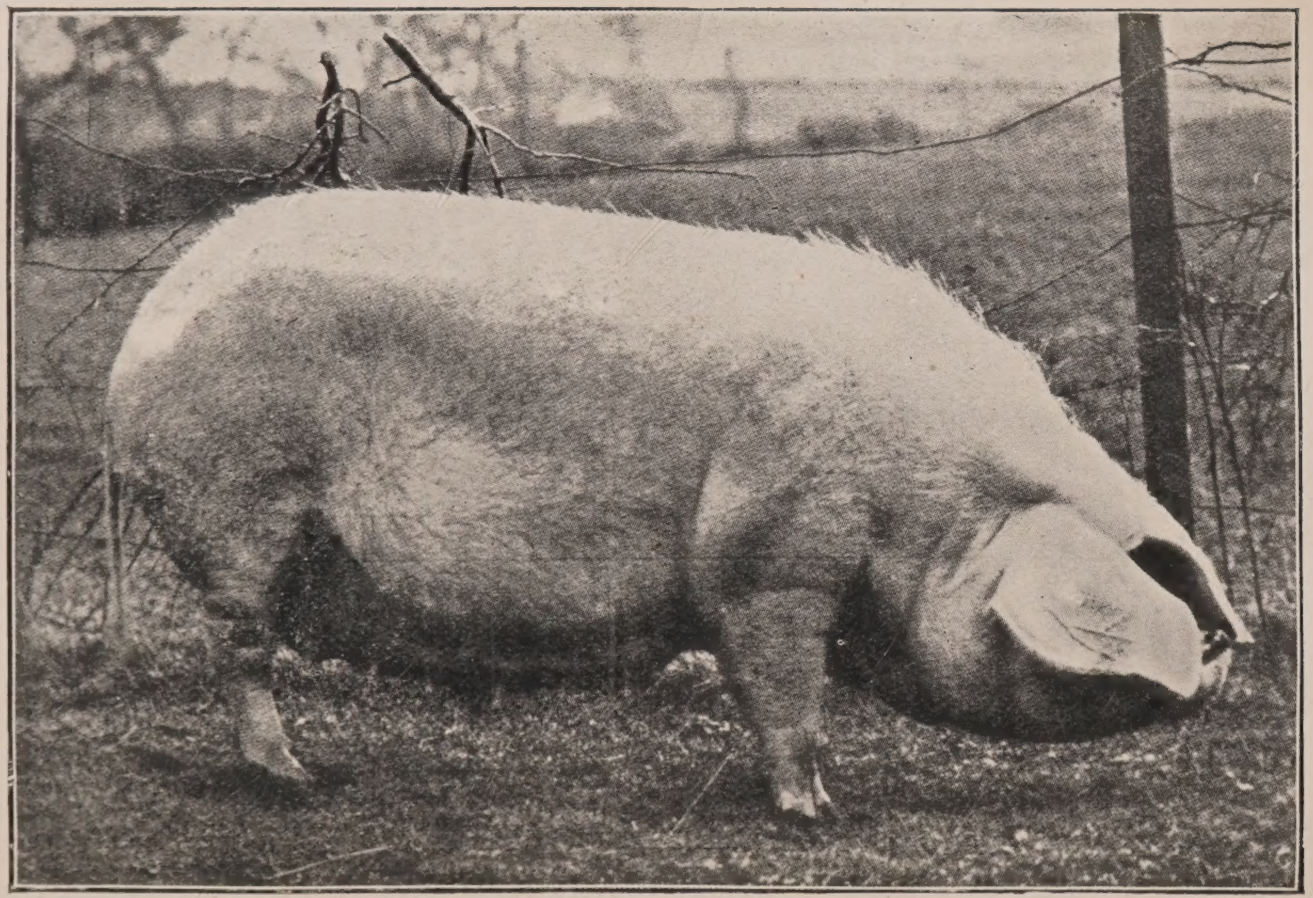

Photo by P. G. Dallinger.

FIG. 1.—A TYPICAL LARGE WHITE ULSTER SOW.
(Aged 2 years and 5 months.)

PIGS, PIGSTIES, AND PORK

BY

G. MAYALL, M.R.C.V.S.

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TRANSLATOR OF A SECTION OF "SPECIAL PATHOLOGY," AND "THERAPEUTICS
OF DISEASES OF DOMESTIC ANIMALS" (HUTYRA AND MAREK)

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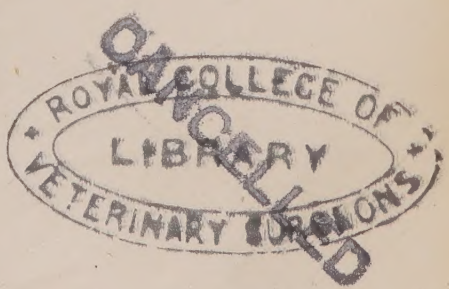

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PREFACE

It has taken a disastrous war to show us plainly in this country what an important part the pig plays in furnishing a supply of necessary food. The great demands on freightage, the activity of the hostile submarine, and the consequent curtailment of overseas supplies of pork and bacon, caused a welcome revival of the pig breeding and rearing industry in these isles. Meat for human food had to be produced as quickly and plentifully as possible, and no animal produces meat in proportion to the food it consumes more rapidly and bounteously than the pig. Apart from its individual merit in this connection, the fact that a sow may have an average of over 6,000 descendants in five years puts her in the front rank as a benefactor to meat-eating races.

Now that a start has been made, it is to be hoped that we shall grasp our trade opportunities with both hands, increase and hold fast our home production of pigs, and never again return to the times which render it necessary to pay away about £100,000,000 annually to other countries for pig products. We do not want all the profits of the pig product trade, but really it is quite time that Britishers had a bigger share of the pig money of the world than they have been hitherto getting.

The author hopes the second edition of this book will be of great use and value to pig breeders and rearers, that it may increase their number, cause them to take an intelligent interest in the quality and welfare of their charges, help them to avoid financial loss, and increase their profits.

In Chapter X. the subject of grazing for pigs is fully discussed. The matter at the present time is important owing to the high prices of feeding stuffs.

G. M.

BOLTON,
February, 1921.

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PIGS, PIGSTIES, AND PORK

I

WILD SWINE

When man lived in a primitive state in caves or rude huts, and long before butchers and fixed dwellings existed, he doubtless gained health, agility, courage, recreation, food, and satisfied his primeval instincts by hunting the wild-boar family, and, perchance, for a dainty, roasting a sucking pig over a wood fire. Whether or not he had learnt to appreciate the taste of a pork chop or a slice of streaky bacon, there is room for believing that a portion of roast wild-swine flesh, rather coarse grained, with more lean in it than fat, and occasionally part of a boiled or otherwise cooked boar's head, would furnish a delectable change from fish, fowl, and other meat. Gradually, no doubt, he would find out that young swine flesh was more toothsome and tender than old pig meat; whilst his wife or female companion would soon tell him what parts of the porcine carcass were the most preferable and tasty, and maybe lard or fat was held in esteem as a body emollient or soother of rough and tender skins. One may even go so far as to surmise that now and then some member of the human family of a more utilitarian cast of mind than his fellows would make a girdle of pigskin to carry his tools or weapons in. The tracks of the swine, indicated by ground rooted up, shrubs and herbs demolished, absence of acorns, chestnuts, and beechnuts under the

trees, and a well-indicated passage, leading, probably, from water to a hidden lair, surrounded by thick undergrowth, with a comfortable cavity, as a domicile, protected from wind, snow, and driving rain, would, no doubt, all fall under the hunter's observation in the natural carrying out of the unordained plan of campaign which results in the survival of the fittest, and a constant struggle, under primeval conditions, to obtain from Nature what she in most cases lavishly provides. Even now, in countries not dwelt upon so thickly, nor road and railway tracked like many of those of to-day, pig-sticking is indulged in as a sport, and hunting the wild boar furnishes exciting moments for man and horse.

In the early history of almost all countries with a temperate climate wild hogs were at one time prevalent. In parts of Europe, Asia, and North Africa they exist to-day, and only seem to have been absent in very cold regions, or in lands baked by the sun and parched for want of water; for the pig is a frequent drinker, and dearly loves a mud-bath.

Swine in their natural state show all the coarse points of pig flesh. They survive among feral animals by their fleetness of foot; large and powerful tusks, which are dangerous weapons in defence; useful long snout, enabling them to dig, and feed on roots and the larvæ of insects; powerful graduated jaws, well toothed, by which they not only graze, but crush chestnuts, acorns, young trees, tubers, mice, insects and their larvæ, molluscs, fish offal, parts of animal carcasses, many hard fruits and substances. In India they often make great havoc among the sugar-canes, liking this food and appreciating the protection it affords as cover. Coarse, thick skins, stiff, bristly hair, long legs, large ears, small eyes, and lean, muscular bodies,

with a powerful neck, are their main external features. They seldom come out in the open in the daytime, but are great night roamers, their acute sense of smell being at this time exceedingly useful to them, both to find food and scent danger. Favoured in these nocturnal rambles by their dusky brown or black colour, with bristles becoming grey-tipped as they grow old, they travel here and there in search of food without being easily perceived.

The boar is a fighter when attacked. He lives alone, but sells his life dearly in self-defence or for his mate and her offspring, acting as sentinel and bodyguard to them. He is larger than the female, being 4 to 8 feet long and 3 to $3\frac{1}{2}$ feet high, with bigger tusks than the sow. At breeding-time he will fight a battle to the death with a rival, and occasionally indulge in a sanguinary conflict with another male member of the herd over some mutually desired object, thus illustrating the combative instinct of almost all male wild animals that run together —an instinct which, from a natural point of view, is desirable as regards the propagation of the race.

In India the wild pig, running as fast as a horse at the gallop, is chased by mounted men, and despatched by the bamboo-shafted spears of the pig-stickers. One noble trait ascribed to the wild boar when being pursued by dogs is that he will not stop to maul a fallen foe, but, if cornered, rips them up with his tusks.

Most wild animals of the same genus are less prolific than domesticated ones, and the porcine race is no exception in this matter. Four to six in a litter is the rule. The youngsters are generally dark brown, with longitudinal stripes of a lighter colour, two broods annually being produced, and their natural life extending from fifteen to thirty years. They grow in size until

the age of five. Water must be near at hand to a herd. The sow likes shadowy places to make her home in at the time of maternity, and will there build a primitive sort of nest for her young.

The flesh of wild swine is eaten as food; the skin makes leather; and the bristles, very valuable as merchandise, are used in brush-making.

In some countries there is a halfway stage in their nature, and these specimens may be called semi-wild. Externally they preserve all the features of the feral race, being rustic in appearance and habits, bristly in skin, long in the tusk, narrow in the snout; feed much on wild produce; run in herds, attended by a man almost as wild as themselves and more unkempt in appearance; or they may roam at will in the forests, being fed on the outskirts by the peasants. Of such are those found in Central and East Russia, and Poland—with long legs and ears, arched back, large bellies, and yellowish bristles, streaked with brown.

In Austro-Hungary the Bakong pig, introduced and bred in large herds by the monastic communities, is semi-domestic, a great traveller, with an active body, carpic back, and rough, coarse bristles of greyish colour. With the advance of breeding knowledge, it is being improved, and Bakongs are gradually disappearing.

In the Carpathian country and Transylvania rustic pigs prevail, with harsh, coarse skins, roaming free all the year round, feeding on roots and herbs, supplemented by bran, oats, and potatoes. Attended by poor mountaineers, they are savage and vindictive in character, and in winter will even wage battle with the wolves. They have long heads, narrow snouts, armed with tusks, long bodies, high, muscular legs, and a stiff bristly mane on

the back, which has caused them to be dubbed "the thorny pig of the mountain" (P. Diffloth).

The wart-hogs of Abyssinia, peccaries roaming in herds, which enter their homes in hollows backwards, and bush-hogs of Oceania and Madagascar, are varieties of wild swine. The last-named have a large excrescence below the eyes.

The pig is of ancient lineage. Solid-hoofed swine are mentioned by Aristotle, and Darwin states that the curly-coated pig has existed for long years on the shores of the Mediterranean, whilst a figure resembling the Neapolitan pig was found in the ruins of Herculaneum. The Chinese grunter was founded ages ago, and is probably as old as the hills and forests.

In 940 Bell records a boar chase in England, and in A.D. 1087 the law enacted that anyone killing a wild boar should have his eyes put out. Some wild swine were turned out in the New Forest in the time of Charles I., and a similar experiment was tried in Bere Wood in Dorset (Cassell's "Natural History"). In 1683 the wild boar was not extinct at Chartley, in Staffordshire. Boar's head was a toothsome dish in the baronial halls of Old England. The late Mr. John Walker, in his useful little book, "Pigs for Profit," writes:

"As a proof of the presence of wild herds of hogs in Britain in ancient days, tracts of land have acquired the names still borne from being the haunts of the untamed or only semi-tamed animals. Instances are: Wild Boar's Fell, in Cumberland; Barlow—derived from boar-ground—near Manchester, and so on. Fritz-Stephen, in his description of London, written in the latter part of the twelfth century, states that boars were among the wild animals which frequented a forest that surrounded the city."

The boar has often been referred to in literature. Shakespeare, in "Antony and Cleopatra," makes mention of "eight wild boars roasted whole." Gray, in 1757, wrote:

> "The bristled boar
> In infant gore
> Wallows beneath the thorny shade."

In the Book of Psalms, in connection with the miseries of the Church, we are told that "the boar out of the wood doth waste it, and the wild beast of the field doth devour it." Sir Walter Scott, in "Quentin Durward," gives the character of the French gentleman Comte de la Marek as "as fierce as the wild boar he delighted to hunt." Probably the Gadarene swine were almost wild, and although "the whole herd ran violently down a steep place into the sea and perished in the waters," its loss, perhaps, would not be much felt in a land where pork was not greatly valued.

In connection with this incident, we are told that "in the fore-feet of pigs is a very small hole, which may be seen when the hair has been carefully removed. The tradition is that the legion of devils entered by these apertures. There are also round it some six rings, and these are supposed to be the marks of the devil's claws when he entered the swine" (Mark v. 11-15).—Rev. E. Cobham Brewer, LL.D., "Dictionary of Phrase and Fable."

Mark Twain, in his "Tramp Abroad," describes how a pig disconcerted the tourists ascending the Mauvais Pas. Of course, such an animal in that district would be imaginary, but the humour of the situation is illustrated by the writer in the following words: "By-and-by we came to the *Mauvais Pas*, or the Villainous Road, to translate

it feelingly. It was a breakneck path around the face of a precipice 40 or 50 feet high, and nothing to hang on to but some iron railings. I got along slowly, safely, and uncomfortably, and finally reached the middle. My hopes began to rise a little, but they were quickly blighted, for there I met a hog, a long-nosed, bristly fellow, that held up his snout and worked his nostrils at me inquiringly. A hog on a pleasure excursion in Switzerland—think of it. It is striking and unusual; a body might write a poem about it. He could not retreat if he had been disposed to do it. It would have been foolish to stand upon our dignity where there was hardly room to stand upon our feet, so we did nothing of the sort. There were twenty or thirty ladies and gentlemen behind us; we all turned about and went back, and the hog followed behind. The creature did not seem upset by what he had done; he had probably done it before."

In any consideration of the raising of the domesticated pig from the wild hog, climate, soil, selection, environment, habits of mankind, and facilities for trade and transit, must be considered. Probably the first domesticated pig originated in China, was made tame in its youth, bred to type, and is now treated so considerately as not to be allowed to walk from place to place.

The long snout of the wild race disappears with domestication, forehead expands, and the legs shorten. Grubbing for food is not necessary, and disuse of an organ causes its decline. Activity and leanness are succeeded by lethargy and fatness, where suitable food is given largely and exercise limited.

The following passage from Darwin will perhaps be a guide to us: "Savages in all parts of the world easily succeed in training wild animals, and those inhabiting

any country or island when first invaded by man would probably have been more easily tamed. Complete subjugation generally depends on an animal being social in its habits, and on receiving man as the chief of the herd or family." The pig is socially inclined, cupboard love is readily expressed by him, his omnivorous appetite renders catering for him easy, and "through his stomach to his heart" is perhaps truer of him than of his superior. Race wildness, then, may soon be expected to give way to tameness, intelligence, and familiarity.

The pig has not often been referred to as a beast of burden, and probably never before nor since has the animal carried such a precious load or been so highly honoured as when "Jane, afterwards Duchess of Gordon, in 1770, undertook for a wager to ride down the High Street of Edinburgh in broad daylight on the back of a pig, and she won her bet" (Rev. E. Cobham Brewer, LL.D.).

II

DOMESTICATED PIGS

The amount of care and method exercised in breeding and rearing pigs, the character of their food, the object aimed at in their production, often achieved by the importation of and crossing with a pedigree race, the conditions and climate under which they exist, will all have their effect on the home-bred animal of any country. It cannot be expected that the quadruped that has in a great measure to hunt for food, receives haphazard rations not always of the most nutritive description, that is not constantly tended or comfortably housed, will exhibit all the neat bodily proportions or fine qualities of flesh and hide to be seen in the most cultivated section of the porcine race. There are few countries where pigs, as a whole, are so greatly cared for as in Great Britain and Ireland.

Certain of the domesticated swine have grown up under almost natural conditions in well-wooded or marshy lands, where a fair, and in many cases sufficient, nutriment can be picked up or dug for. The inhabitants keep an eye on them, and slackly control them. Big open spaces in the forests have been utilized as their feeding grounds, or they roam about on the hillsides. They know not the luxury or inconvenience of being housed. They are domesticated natural races. Their surroundings, the method of living of the people who attend them, their active habits, and the necessity of searching for food, have all helped to form

their external characteristics. They are big, coarse swine, often of a dirty white, reddish-brown, or black colour, with long legs and stiff-haired skin.

In Bavaria, Russia, Transylvania, Sweden, Norway, Sardinia, and on the shores of the Mediterranean, these natural races exist. In many cases during the last century the animals have been improved by judicious crossing and extended breeding. More nourishing and suitable food has been given them, and, if not housed—which in some countries naturally might not suit them—an endeavour has been made to produce the most useful animals by the cheapest methods. Care in feeding, rearing, and observation of their good points, have brought them along to a higher plane. They thrive in the climate of their own country, but soon deteriorate again through bad food and lack of care. The more intelligent and better off the people, the more easy the means of national intercommunication, the brisker the commerce, the nearer to a suitable and paying market, the more improved the races become and the farther they spread.

Crosses between natural and cultivated races, or between natural breeds of the same or different countries, without consideration of a useful object or of desirable points, has produced many pigs of no particular type and of no definite race.

The domesticated pig has not really much sense of feeling, and often cries out before being hurt. Whether the skin be thick or thin, the layer of fat beneath plentiful or scarce, few nerves are present there. Sight, hearing, and smell are good as a rule, and the last-named sense has been stated to be so acute that the animal has been used as a discoverer of the truffle, an underground fungus dear to the heart of the cook and the epicure. Taste

would appear not to be very well developed, but if the animal has the choice between different kinds of food, preference will very soon be shown for that which is most tasty and sound. Temperament is rather wild, destructive, obstinate, and occasionally vicious; but kindness and good feeding lead to tameness, intelligence, and docility.

The fecundity of the female animal is well known, and is one of the most valuable assets. A sow may have an average of over 6,000 descendants in five years, if she be spared by disease and the butcher's knife, and if she only produce ten youngsters a year. The Frenchman Vauban has calculated that in ten years a sow might possess 6,434,874 members of the family tree, calculating only six to a farrow.

The present-day porcine breeds of our land are supposed to have resulted from a cross between the native breeds and the Neapolitan and Chinese pig. Darwin states that Lord Western first imported a Neapolitan boar and sow into England about the year 1830. As might be expected from the character of our country, and the habits of its agriculturists, cottagers, and peasantry, swine are much managed and controlled, and do not lead the free lives of many of their race in other countries; consequently, as a whole, the pigs here are fine bred, their rearing is watched over, desirable points from the profit side of view are considered, and they possess most of the qualities of a highly cultivated race. A special chapter will be devoted to their consideration, and, as we shall see below, they have travelled far and wide.

The following short descriptions of some of the domesticated races of other lands are taken from the book "Moutons, Chèvres, Porcs," by Monsieur Paul Diffloth. The chief domestic pigs of France are:

1. **The Craonnais,** so called from the town of Craon, in the neighbourhood of which the race is largely bred. Formerly these animals were of a rustic nature, great walkers, with large frame, long neck, flat sides, curved back, long drooping ears, and skin covered with rough yellowish hair. Great improvement in the breed has recently been effected, chiefly due to crossing with the Berkshire. This pig to-day has a finer head, short neck, long back, and rounded sides; the hams are larger, the legs shorter, but always muscular, and the carcass more meaty than fat-laden.

Exhibitions have been held at Craon and Château-Gontier since 1895, and have tended greatly to improve the race. Craonnais pigs have been advantageously crossed with the Yorkshire. In the Canton of Bierné a Craonnais sow with eight litters brought in 3,000 francs (about £118 5s.) for her owners, and another one in eight years gave birth to 122 youngsters, which were sold for 3,400 francs. The sows have well-developed abdomens and pelves, and numerous well-shaped, regularly spaced teats.

Fatting and rearing are both carried on in the Craon region, and a sow, giving two litters annually of six piglets successfully brought up, will procure an annual average revenue of 600 francs to her owner.

2. **The Normandy** in early days was one with a small pointed head, narrow or large pendent ears, and yellowish-white or black colour. The Normandy sow is very prolific, and in the valley of the Auge the race has been greatly improved. From the residues of the dairies and creameries a good supply of food is derived, and the animals are well cared for by their possessors. Fatting of the pigs for local consumption and for trade is largely

carried on, and numerous pig-markets are held. A great breeder of this race may sell from 10,000 to 15,000 francs' worth of live-stock a year.

The type of the Normandy pig in the Auge district has a short skull, large flat forehead, forming an obtuse angle at the base of the snout, large and elongated face, long nose, and short legs.

In a province famed for its production of milk, and with an intelligent, industrious population, the Normandy pigs thrive; their hygiene is strictly attended to, and a wise selection and rearing have made their standard an excellent one. In the Department of l'Oise the Yorkshire boar has been busy procreating crosses. The sows here are not so well selected, whilst the mongrels obtained fatten well, but are not prolific. They are not pastured, but all housed, are fed for fattening at four or five months, and killed at eight or nine.

3. **The Limousin** pig, prevalent in the centre and south of France, furnishes a large supply of the pork consumed in Paris. The race presents a white coat, with two black spots on the head and rump. The patch on the head may extend to the shoulders or be confined to a strip between the ears; the pigmentation may comprise the croup or be localized on one fetlock. Apples, chestnuts, and buckwheat are grown in the Limousin province, and the race, kept true in this part, though varying farther afield, is fairly well cared for and intelligently bred. The carcass furnishes much lard and fat. The swine are not very precocious, as they are at times insufficiently fed whilst growing; but, if well cared for, they improve in this respect. When fat a carcass may weigh 200 to 250 kilogrammes (440 to 550 lbs.), but the average weight is about 150 kilogrammes. To maintain

the purity of the race a herd-book was established in 1894.

4. **The Lorraine** pig has a large head, with pendent ears, a dirty white colour, longish legs, and arched back. In Lorraine and Alsace their flesh is highly esteemed.

In **Denmark** there are two types of swine natural to the country. **The Jutland** is a pig of large size, with drooping ears, lengthy body, long limbs, and early growth. **The Seeland** is small, with erect ears, compact body, and is slow in growth. They are rustic in nature, and find most of their food in the forests.

Yorkshire boars are bred in Denmark for crossing, and much improvement has been brought about in the indigenous races by the establishment and rigid supervision of breeding centres. Thus, the commissioners appointed to inspect the studs decide on the choice of the animals for breeding, overlook the points of the race, and see to their pedigree. Pedigree boars are purchased to cross with the Seeland and Jutland. The State supports the movement, and gives a subsidy of 70 francs a year for each boar owned by a society comprising eight proprietors, who are expected to possess fifteen sows amongst them.

In 1907 there were 243 of these societies, possessing 322 boars.

By co-operation, State help, and intelligent discernment of prime quality in the live and dead animal by the business-like Dane, Danish pig-produce has gained an almost world-wide reputation.

Germany* has been a large importer of pedigree swine from England. The large whites were introduced into

* Descriptions from "Practische Schweinezucht" (Dr. C. Nörner).

that country in 1851; the Berkshires have not had such a great vogue, chiefly owing to their black colour. The Tamworths and Black Cornwalls have been brought in here and there.

The native races of the Fatherland may be designated " unimproved " and " improved."

1. **The Bavarian Red-spotted Pig and the Hanover Black-spotted Pig** are the types indigenous to Germany that have been kept pure. The Bavarian woods are the home of the former. The colour of the race is red and white. The fore part of the body, the belly, and inside the thighs are white, and hind part red, the red colour extending along the back. On the anterior of the body, especially the head and base of the ears, there are frequently red spots. The head is long and narrow, snout long and pointed, to facilitate rooting and grubbing. The eyes are small, but expressive, and ears half-drooping. They often have an appendage under the ear—the so-called *Glöckchen* (little bell); skin well haired, with good bristles along the back. They are long and deep, but not wide, animals, and grow quickly. The sows are good, careful, fruitful mothers, giving milk sufficient for their very numerous progeny. In 1895 the Swine-Breeding Society was formed in Roding for procuring and keeping suitable boars, the raising of the standard of the type, and especially the culture of the pure Bavarian race.

2. **The Hanover Black-spotted Pigs** are prevalent in the south of Hanover, reaching as far as Brunswick. The head is narrow and long, face slightly dished, nose bowed, snout long for rooting, and normally the head is carried straight; back muscles not greatly developed; eyes large and intelligent; ears not very large, pointed, and standing out; sides long, deep, and rather flat; fleshy hams, and

bones not too big; colour, black and white, the former colour sharply defined from the latter; head and hind parts black; lively temperament, and boars often savage and wicked. The animals have good health, robust constitutions, and their flesh is very tasty. The sows are sufficiently prolific, and careful, attentive mothers. A society to keep the breed pure and improve the race was founded at Hildesheim in 1899.

Both the above-described families are typical representatives of the unimproved native German pig.

3. In **Oldenburg and Westphalia** swine have been crossed with the Yorkshire, an improved animal produced, whilst Westphalian hams have acquired great fame.

4. **The Baldinger Tiger Pig** is a long-haired, black-speckled specimen, produced by crossing the Bavarian with the Berkshire. The colour is black, with white stripes or spots, but the skin is white.

5. The improved marsh pig has resulted from a crossing of the large-eared German **marsh pig** with English swine. This breed is very prevalent in the north and centre of Germany.

The Swine of Italy are found abundantly round about Naples. They are of medium height, have level backs, are greyish or spotted in colour, and seldom black. They live for a great part of the year at liberty, but fatten easily if well fed. In Central Italy, in the woods of the Papal States, the Roman pig leads a rustic life. With long legs, thinnish body, thick hair, red or yellowish-red in colour, the flesh of this animal is greatly liked by the inhabitants.

In **Spain and Portugal** a small race of pigs exist, with fine hair and skin. They fatten easily, but are seldom housed; feed in the woods and on the hillsides, and con-

sequently never become very weighty animals. Most of them are red in colour.

The chief pigs of **America** are the Poland Chinas, the Duroc Jerseys, and the Chester Whites.

The Poland China is a large-sized pig. It is said to be the best pork-making machine in the world. The colour is black, with white spots on the skin. The head is small, nose flattened, ears directed forwards and pendent. It is a cross-bred race, supposed to have resulted from mating original native pigs of Warren County with China, Russian, and subsequently Berkshire stock imported into the country.

In 1816 John Wallace imported three sows and a Chinese boar into Ohio. Twenty years after, the Berkshires were introduced (P. Diffloth).

The Duroc Jersey is a good-constitutioned red pig, said to have been produced by the crossing of English, Spanish, and other imported stock on the indigenous breeds of the States. It is very similar to the Tamworth pig of this country, but differs in having bent or broken ears. It is a good grazer, thriving well on grass, grains, and roots.

The Chester Whites arose from the crossing of Bedfordshires with the common pigs of the country. They are a large breed of pig, and are not in such favour in the States as the Poland China. They cross well with a small white boar.

The American has striven to produce a quick-fattening, marketable, packable product, and how well he has succeeded is indicated by the fact that nearly 13,000,000 pigs were packed in the Western markets in 1908, and over 11,500,000 in 1909.

III

BRITISH AND IRISH PORCINE BREEDS

Foremost of these is the **Large White** or **Yorkshire** race, which originated by the crossing of our indigenous Celtic breeds with boars brought from China and Naples. In 1830 Lord Western imported a Neapolitan boar and sow into England. The Chinese pig was probably brought in even earlier, maybe in the seventeenth century. The animal from the Far East is white, black, or red (probably we imported the white one), noted for its prolificness, the ease with which it puts on flesh, and its small proportion of offal and bone. The one from sunny Italy is grey or black, has a regularly rounded body, small head, and fine limbs; is more delicate in constitution than the Chinese, and less fertile, but fattens easily.

In was in 1851 that Joseph Tuley, a Yorkshire weaver living at Keighley, exhibited his noted Large White pigs at the Royal Show at Windsor. Through him the race first became widely known. His sound judgment and great ability in breeding the animal brought him fame and material gain. His Gothic villa " Matchless " was stated to have been built out of the profits received from the sale of one of the litters of his famous sow, Matchless, whilst his boar, Samson, was an almost equally noted male member of the family. Those who know the Lancashire and Yorkshire artisan, his enthusiasm and shrewdness in the management and breeding of small stock, such as pigeons, rabbits, dogs, fowls, and ducks, can easily understand

the spirit with which Tuley would enter into the conduct of his particular venture. We may be sure that he not only understood the art of breeding good stock, but the science also of profitable reproduction, for the commercial mind is seldom absent from the headpiece of the workers in the mill counties.

Mr. Wainman, of Carhead, Yorkshire, was a great buyer and exporter of Tuley's products, and his name will always be associated with the wide distribution of the breed and the carrying of its fame into other countries. Mr. Fisher, who was Mr. Wainman's shrewd and successful herd manager, helped materially to perfect the work.

The large white breed has spread into many of the English counties, and may be found in Lancashire, Leicestershire, Lincolnshire, Huntingdon, Nottingham, Cheshire, Norfolk, etc.

Some of the most noted present-day breeders are the Earl of Ellesmere; Sir Gilbert Greenall; Messrs. Chivers, of Histon; White, of Spalding; Dalby, of Kidderminster; Hallas, of Helsby; Major, of Ramsey; William Mitchell, of Kirby Bedon, near Norwich; Wells, of Saffron Walden; and Viscount Elvedon. Abroad, the breed has gone to France, America, Germany, Denmark, Sweden, Holland, Belgium, Italy, Switzerland, Russia, and Austro-Hungary.

Why has this breed grown, spread, and been desired? There are many reasons. Among breeders it has been found that form and quality can be brought up to a high pitch in this race. By careful, wise breeding, rearing, and feeding, the attribute of profit can be sooner reached and maintained in this breed than probably in any other. Experience, effort, knowledge of pedigree and points, will all help in this connection. These pigs come to maturity

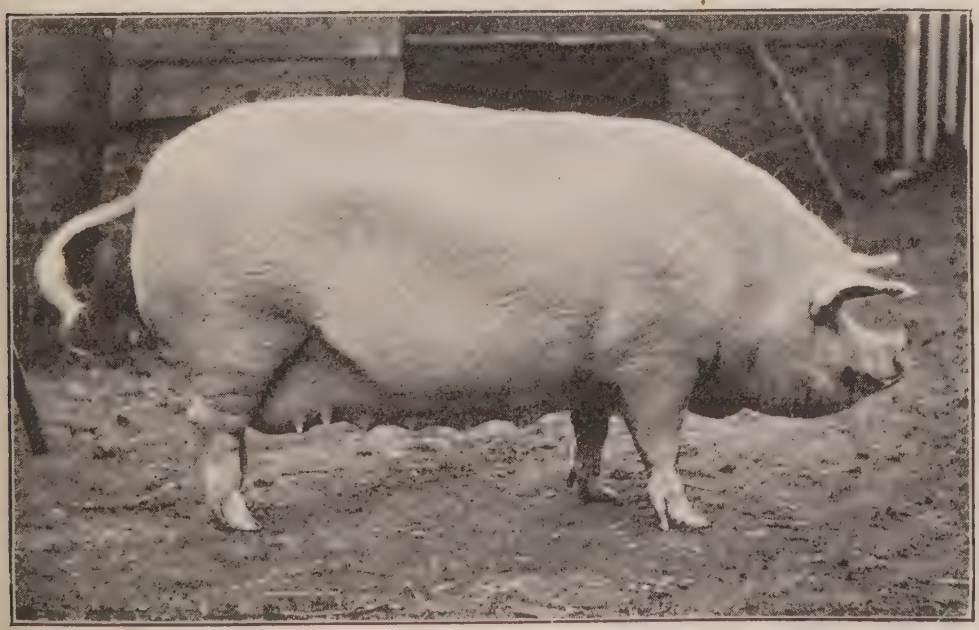
early, fatten quickly, have good constitutions, and are quiet, steady grazers and feeders. The sows are prolific and very satisfactory mothers. The race blends with and improves the quality of the porcine stock of most other countries. All these desirable attributes would, however, be of little use unless there was a good demand for the possessors of them. The size and form of the pig make it a desirable purchase for the butcher, the waste in the carcass being small. The educated taste (in almost every case advancing) of most civilized communities desires nowadays a fine quality of fat and lean in pig-meat. Even the exigencies of commerce require porcine carcasses easily packable, storable, and that will pay freightage dues in the most economical manner. The Large White Yorkshire boar has tended to satisfy these demands in his progeny when crossed with the races of other countries, and hence is a desirable export animal. The establishment of a Herd-Book in 1885 has materially helped to keep up the standard of excellence in the family.

A good specimen of the race should have a white and rather thin skin, with fine hair on it. Blue spots may be present on the integument, but are undesirable. Face slightly dished; head moderately long; snout and forehead broad; the neck fleshy; back and loins level and broad; chest deep; belly full; legs straight, well set, with plenty of flesh at the shoulders and thighs; action steady, free, and no rolling gait behind. The pig, looked at as a whole, should be compact, with all parts in proportion, fine and flat in bone, and deep and fairly wide in barrel.

The Middle White Yorkshire race owes its origin to the desire for an animal possessing a combination of the good qualities of the Large and Small White breeds. When Tuley was at the height of his breeding and exhibiting

Photo, G. H. Parsons.

FIG. 2.—LARGE WHITE BOAR : WORSLEY TURK, IV.
Owned by the Earl of Ellesmere. First and Champion, Bath and West Show; First, Royal Lancashire Show.



Photo, G. H. Parsons.

FIG. 3.—LARGE WHITE SOW : BOTTESFORD MARCHINGTON QUEEN.
Owned by the Earl of Ellesmere. First and Champion, Royal Show.

Plate III.

Photo, G. H. Parsons.

FIG. 4.—AGED LARGE WHITE BOAR : SAMPSON OF WORSLEY.
Owned by the Earl of Ellesmere. First, Royal Show.

Photo. G H. Parsons.

FIG. 5.—GROUP OF LARGE WHITE GILTS.
Owned by the Earl of Ellesmere. First and Second Prize Pens, Royal Show.

fame he displayed some animals at the Keighley Show which were considered too small to be included in the Large Whites. They, however, possessed so many good qualities that the judges could not overlook them, so a distinct class was made for them. Thus did the Yorkshire weaver again become a great benefactor to mankind and a special one to his fellows, by originating a pig admirably adapted for the small man, and Middle Whites are now as noted as, and probably more widespread than, the larger breed. As profitable and economical animals these intermediates can hardly be excelled. They are small in bone, light in head, cylindrical in body, scant in offal, and not so fat-laden as the little swine. They have a fine-grained quality of lean meat distributed evenly throughout the carcass. In youth they grow quickly, putting on flesh at less cost than the Large White. The early method of breeding them would seem to indicate that there might be much difference in the size of individual litters. We know that to produce the race Tuley coupled a Small White boar with a Large White sow, but doubtless some breeders may have put the big boar to the little sow. While the type was being established, much knowledge of bodily form and prolificacy would be necessary to produce the best results and to avoid the bad constitutional effects of in-breeding.

To-day the animals are uniform in size, prolific enough, and produce strong, healthy progeny, which in shapeliness of form can hardly be surpassed. They keep to type and seldom throw back, thus exemplifying a noteworthy breeding fact in domesticated animals—viz., a breed keeping true whose originators were formed by crossing of one or several distinct tribes.

The Middle White is of a quiet, docile temperament,

and a good grazer and feeder. Mr. James Long, in his "Book of the Pig," writes: "The Middle White is admirably adapted for crossing upon the common pigs of the country, and we can point to at least a score of herds in our district that have been materially improved by the introduction of blood from the pure race. The cross generally produces a pig that matures earlier, fattens more quickly, and requires a smaller quantity of food than the common pig; and instead of unsightly, gaunt, flop-eared, large-boned animals, a much more symmetrical beast is produced, and one of which every man who has an eye for shape must be much more proud."

Breeders of common pigs throughout the country should take these words to heart and try to improve their stock.

Noted herds of Middle Whites are those at Castlecroft, Wolverhampton; Prestwood, Wednesfield; Weeley, Essex; Messrs. Leopold Paget's, of Middlethorpe Hall, York; Lord Ebury's, Sotwell, Berks; and the Sidbury Herd, Worcester.

The Points of the Middle White Breed are a white, fine skin, free from black hairs or blue spots; face dished; head fairly short; snout and forehead broad; neck moderate length, filling out to the shoulders; back long, level, and wide; loins broad; chest wide and deep; belly full, with a straight line under; legs straight and level, with fine bone; hams full, coming well down; action firm, free, and springy.

The Middle Whites have gone to Germany, France, Denmark, Holland, Belgium, America, etc.

The Small White.—These pigs are now only a fancy breed, kept by men who may have an outlet for them, or who like animals different from their neighbours

—beautiful in form, but intrinsically unprofitable. Butchers fight shy of them, as in the carcasses fat preponderates greatly over lean. The breed originated by crossing the small Yorkshire sows with the little Chinese boars. The Windsor breed of Small Whites bred by the Prince Consort achieved much fame in its day. The head is quite short, the snout pug-like, the skin plentifully supplied with good-quality hair, the bone fine, and symmetry of the animal very good. The live weight may average from 220 lbs. to 300 lbs. They mature quickly, soon fatten, and will maintain adiposity even when feeding only on grass. The sows are not very prolific, producing from five to seven in a litter, with a tendency for the numbers to decrease as the mothers put on fat; moreover, good constitution in the progeny is often wanting. A sucking-pig for the banqueting table frequently comes from this race.

They are a rather delicate family, soon feeling changes of weather, and, being short of limb, cannot search strenuously for food or walk far and long. Perhaps their chief characteristic is a strong tendency to put on fat, and they may be described as the premier porcine in this respect.

The Standard of Excellence.—A pure white skin, with a plentiful supply of fine hair, and no wrinklings or spots; face short, dished, and snout turned up; ears small, short, and erect; neck short and thick; back level and broad; loins wide; chest full; belly deep and near the ground; legs short; hams deep, wide, full, and well rounded. The head and legs are quite small compared with the trunk, and the eyes are almost hidden through fatness.

The Berkshire.—It is said that this breed originated

from crossing of the indigenous varieties, and notably the large Lincolns with Chinese and Neapolitan boars. Lord Barrington was an early breeder of the family. In its native home of Berkshire and Wilts the rusticity and precocity of this race may be well seen, and they have spread into many of the counties in the Midlands and South. They flourish equally at pasture or when housed, fatten easily, furnishing good flesh and fine lard. They pick up an adequate amount of vegetable food on the stubble and under the trees in summer and autumn, and, though hardy in constitution, do not do well in cold and wet; hence housing is desirable at these times, and a warm climate the more preferable for them. The sows maintain their condition during motherhood, and bring up seven or eight youngsters at a time very well. The race has strong power of resistance to disease, is active, and generally "good doing." The most profitable specimens are long in the body, deep in the flank, with fat and lean proportionately distributed throughout the carcass. By careful selection and breeding the weight and form of the animal can both be improved.

Noted breeders of Berkshires are—Mrs. Bainbridge, of Plympton; Hon. Claud Portman, Stratford-on-Avon; Lord Ebury, Sotwell, Berks; Captain Behrens, Malton, Yorks; R. W. Hudson, Marlow, Bucks; the Reading Corporation; G. P. Sanday, Puddington Hall, Chester; Frank Smith, Wantage, Berks; Alpass, of Berkeley; Smith, of Westcott; Palmer, of Wokingham; Hall, of Fevring; Wright, of Elstree; R. W. Hobbs and Son, Lechlade; and many others.

The race has been exported into France, Germany, America, Italy, Hungary, and Switzerland.

Points of the Berkshire.—Black-coloured skin, which

if of a plum-coloured tinge so much the better, with long, fine, thick hair; white on the feet, face, tip of the tail, and occasionally on the forearm. Face fine, dished, and broad between the optics; eyes large, expressive, and not deep set; snout fine and long, although some like the unnatural short, broad one; ears erect, or slightly drooping forward; neck fleshy; back long, broad, and generally arched; sides deep, well let down, and straight at side and bottom line; legs and feet set wide apart, short, straight, and strong. An active, vigorous, and hardy race, with good length and quality.

The Tamworth.—In Staffordshire and the neighbouring counties one finds these chestnut-red coloured pigs. They are great favourites with all classes in these parts, and may be seen in herds on the holdings of the well-to-do as well as singly in the small man's sty. Rustic to a degree, they are in their element when grazing, searching for acorns, or grubbing for food. Hardy and strong in constitution, bad or cold weather does not greatly affect them. As bacon pigs they stand in the front rank, and as porkers produce nice quality meat. Attaining a weight of 20 to 25 score at twelve months, they yield a large proportion of lean flesh.

The sows are very prolific—in fact, some have thought them too much so, but the mothers usually have plenty of milk for the wants of their numerous progenies. At nine months old a litter may be produced, and the lot be very even in size, a feature noticeable in the race as long as procreative powers are exercised. The body is large, long, and squat, and the legs rather short.

Noted breeders of Tamworths are—Major Morrison, of Basildon, Berks; Mrs. Lancaster, Kellmarsh Hall, Northampton; Philip, of Whitacre; Jarrold, of Thorpe, Nor-

wich; Robert Ibbotson, Knowle; Oswald Riley, Ledbury; and others.

A good specimen Tamworth should have bright rusty hair, plentiful, long, straight, and fine on a flesh-coloured skin, free from black; face dished, wide between the ears; snout long and straight; ears large, straight, and carried forward; neck long and muscular; back long, straight, and rather narrow; sides long and deep; hams broad, full, and well let down. This pig has gone into Germany, Austro-Hungary, and Switzerland.

The Large Black Pig.—These pigs have been bred for many years in Cornwall, Devon, Suffolk, and Essex. Before the foundation of the Large Black Pig Society in 1898, the inhabitants of the East and West of England kept the members of their respective herds strictly apart. Those of the West were the larger and heavier, those of the East hardier and more prolific. Since the introduction of a Herd-Book and the L.B.P. Shield, too close breeding has been avoided, fresh blood brought in, and boars judiciously used. The temperament of the race is calm, the boars docile. Grazing and feeding well, this pig has a hardy constitution, and is not affected much by weather changes. It accommodates itself easily to varied conditions, is a good export and commercial animal.

Prolificacy varies in individual herds, in some ten to twelve at a litter being the average, in others six to eight. The bacon and pork are a trifle coarse, but well flavoured and much appreciated by some tastes.

Noted breeders of Large Blacks are—Messrs. Robinson, Iford, Lewes; Terah Hooley; Ringer, of Swardeston; S. F. Edge, of Ditchling; Stimpson, of Bixley, Norwich; Glover, of Cornwood, South Devon; Pearce, Whittington,

Bichfield; Kay-Mouatt, Malvern Wells; Major Speed, of Canterbury; Trewhella, of Hayle.

Points of the Breed.—A long, level back, with a corresponding depth of trunk (a curved back-line is considered good in the sow); oblique shoulders; sides well arched; hind-quarters well developed; head medium length and wide between the ears; ribs well sprung; loins and chest wide; long, fine ears, falling over the eyes; neck muscular and not too short; skin soft, fine, and greyish-black slate colour; hair not too strong, thick, but silky.

The sides of the members of some herds are rather flat, the shoulders badly put on, the hair often very unequal, and hams not as well formed as they might be. The attention now being given to the race is grading this pig up and improving its size, quality, and fleshing.

The Gloucestershire Old Spot Pig.—These pigs have existed as a pure breed in the Berkeley Vale for very many years. Their colour is an even mixture of black and white in the form of either black spots on a white ground or of white spots on a black ground, according to the preponderance of either colour. Whether the tendency is to black or white a pure black or pure white pig is unknown. They are prolific pigs, and always make the best use of the whey that is produced in abundance in this cheese-making district. They are free roaming and good grazing pigs with robust constitutions, and furnish excellent bacon. If given a grass run from April to November and then corn feed they fatten rapidly. As a general service pig for smallholders they are in the first class. They are good pigs for the colony system and fine grazers in orchards.

Noted breeders of Old Spots are—Earl Beauchamp, Earl Bathurst, Sir Charles Bathurst, Lord Fitzhardinge,

Sir Richard Cooper, Alex Brown, Failand, Bristol; J. H. Thomas, of Pilning; R. E. Parker, of Easton, Norwich; Major Von Rozenburg, of Lydney; Richard Guilding, of Tewkesbury; Captain E. P. Brassey, of Copse Hill, Lower Slaughter; Alfred Jones, of Dursley; Mrs. Tuck, of Wootton Bassett, Wilts; the Olympia Agricultural and Pure Stock Farms Ltd., Selby, Yorks, owning the Selby herd of Old Spots; and many others.

The Small Black.—Types of this breed are met with in Essex, Suffolk, and Dorset—well-formed pigs, making up into fat carcasses, but rather delicate in constitution. Their aptitude to put on obesity does not make them excel in prolificacy, or to have the stamina which is always desirable. As a race they are declining in popularity and numbers. Quiet and docile in nature, they sleep, grow fat, come to maturity early, do not furnish too large a proportion of offal, but supply a large amount of lard. They are good grazers.

Points of the Breed are good quality flesh; fine black hair; slightly turned-up short snout; deep carcass; legs well formed and square set.

The Lincolnshire Curly-Coated Pig.—This animal is coming along in favour. Exhibited first in 1907 and 1908, it is claimed for its members that they mature and develop more rapidly than those of any other porcine race in this country. The sows are prolific, have the full number of teats, and plenty of lacteal fluid for their numerous offspring. The Lincolnshire farmers have recognized the worth of this hardy race for many decades.

Mr. G. Freier, of Spalding, a great breeder of the genus, writing in the *Farmer and Stockbreeder* Year-Book for 1910, says that "out of the 1,059 pigs exhibited and

weighed at Smithfield, the Lincolnshire Curly-Coated Pig made the highest average daily gain of any single pig of any breed, and that its class average is higher than any other breed. These results strongly support the claim that this hardy, vigorous, sound, and prolific breed of pigs is the best of any. The following little table shows the gain in live weight of pigs exhibited by Mr. Caudwell, of Boston, another noted breeder:

Age.	Hog farrowed January 15. Weight in lbs.	Gilt farrowed January 22. Weight in lbs.
11 weeks old	103	84
22 ,,	247	229
33 ,,	432	409
44 ,,	589	613

" The highest weekly gain was 23 lbs. in the twenty-sixth week with the hog, and 32 lbs. in the forty-third week with the gilt. They cross well with other suitable breeds. Fairish pork and good bacon are furnished by them."

Main Features.—White, thick skin, covered with much curly hair or fine bristles; hanging ears; long jowl; rounded ribs; strong, wide back, and big, heavy carcass, supported on strong, firm legs and feet.

Noted breeders of Curly-Coats are Messrs. Freier, of Spalding; Simpson, Claythorpe, Notts; Stennett, of Gainsborough; Bowser, of Boston.

Mr. W. J. Malden writes thus of the **Wessex Saddleback Pig**: " This pig, for which a society with Herd-Book has been established, has long had a strong vogue in Wessex, and is known outside it, breeds having been kept in distant counties, and in Ireland. In America it has been bred with much care since its importation in 1825; the

society—known as the Hampshire Belted Pig Society—has worked it up to considerable excellence. The breed had origin more than a century ago in the Isle of Purbeck, and there is every reason to suppose that it is the outcome of breeding with the Neapolitan and China pigs on the native stock. The native characteristics are strongly maintained, and it is remarkable that the breed marking —white from toe to toe over the shoulder—should have been so persistent where pedigree breeding has been so much neglected; and it is only its exceptional aptitude to 'earn' a living by grazing and in woodlands, combined with quick maturity when brought to the sty, producing very selling meat, that have kept it from being extinguished by pedigreed pigs of other breeds. The call for pigs during the war, however, fell with especial severity on the breed; and the high price given for big sows and boars for slaughter tempted the owners, many of whom were smallholders and foresters, to part with their breeding stock. The foundation of the Wessex Saddleback Society was only just in time to prevent its extinction; but its future is now assured, and under careful breeding there is no fear that its excellent natural features will not be developed to the best.

"The features of the Saddleback Pig are:

1. Its splendid constitution and powers of resisting diseases when living under conditions where other pigs are liable to exhibit weakness.

2. Its prepotency, which ensures the maintenance of its characteristic features.

3. Its aptitude to live wild, and yet retain a quiet and contented disposition.

4. Its powers of 'earning' its own living whilst living in the rough.

Plate IV.

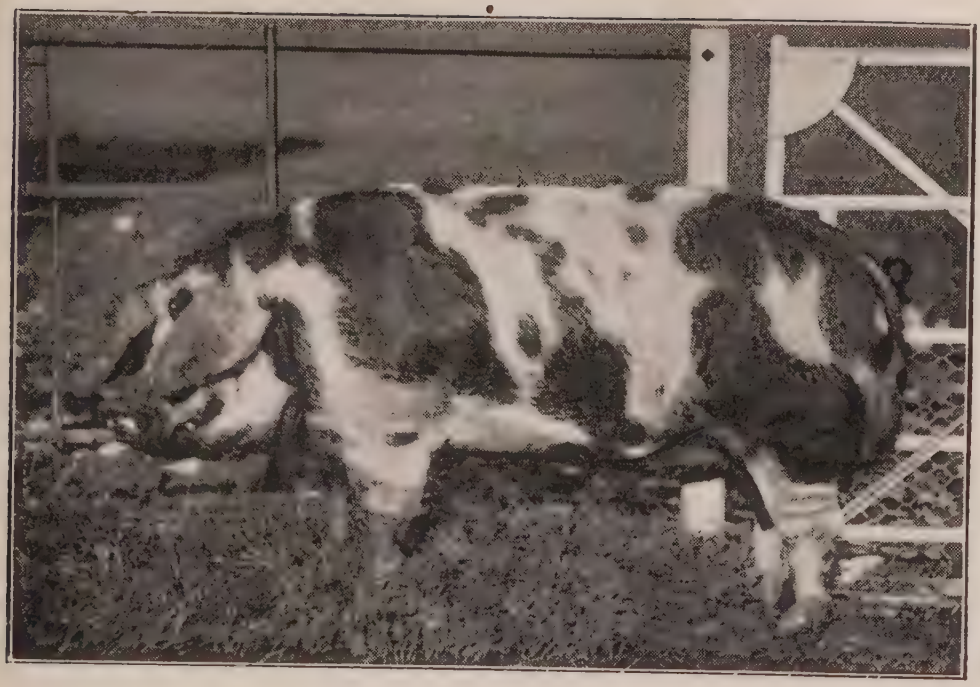


Fig. 6.—Gloucestershire Old Spot Boar.

Fig. 7.—Wessex Saddleback Pigs.
Owned by Mr. E. E. Rolls, Romsey.

3

5. Its aptitude to fatten quickly when taken to the sty.

6. Its suitability to be killed at any age or weight.

7. Its high quality meat, and suitability to being used as fresh pork or as bacon; which, as it always ' dies well,' make it a special favourite with the butcher and provision merchant.

8. The fecundity of the sows, and their capacity to rear big litters.

9. The rapid rate of growth of the young whilst on the sow, which is maintained until great weights are reached.

10. Its notable grazing and masting powers, which make it eminently suitable to run at grass, or to find a living in woodlands.

11. The hardiness which a century of living out through winter has developed.

12. Its suitability to mate with breeds of weaker constitution.

13. Properties which adapt it to the needs of the large farmer or the ' small man ' equally well.

14. Occupying such a wide area, it has escaped the dangers of too close in-breeding.

15. Having been kept over so big an area, it is indigenous to all classes of soil—from the chalk to the clay, from sand to peat.

16. Its activity and ready habit of ' grubbing ' for living when food on the surface is in short supply. What makes it especially suitable to modern requirements is the fact that ' living out,' to which it has been accustomed and acclimatized, is being strongly advocated in districts in which this old custom had long died out. The Sheeted pig has always laid out—hence its exceptional constitution. It is, in fact, the premier grazing and woodland pig."

Noted breeders of these pigs are: Sir A. Mond, Bart., Romsey; Sims and Morrison, Brockweir, near Chepstow; T. L. Martin, Basingstoke; Captain Bayne, Farway, Honiton.

The Large White Ulster Pig (see frontispiece).—We are indebted to Mr. Kenneth MacRae, of Belfast, Secretary of the Royal Ulster Agricultural Society, for the following particulars of the Large White Ulster Pig as given in the Herd-Book:

" It is admitted that the type of pig which prevails in the North of Ireland, and which has been identified with the province for upwards of half a century, possesses not a few admirable qualities, notably its early maturity and suitability for high-class bacon-curing. Unfortunately, however, it is in part deficient in conformation as compared with other well-established varieties. This deficiency has been caused largely by indiscriminate breeding, frequently from inferior specimens, and without proper regard to the production of those essential qualities necessary in a typical bacon pig. These admittedly serious defects, which called for remedial consideration, were attributable mainly to breeders who were without a standard to guide their operations, and whose undesirable stock, in consequence, bore severely indelible evidence of indifference or haphazard. Still, the produce was of a fixed type. As the greater number of breeders in Ulster would not use the Large White (York) pig, it occurred to the Royal Ulster that something should be done to give a fillip to their interest, and effect, if possible, an improvement in the native stock. With the object of formulating a practical scheme that should definitely apply to breeding in Ulster, meetings of breeders and feeders of pigs and bacon-curers in the province were convened by

the Society, and the question exhaustively discussed. Finally, it was agreed by unanimous resolution to institute a Register of the breed, and the Royal Ulster was authorized to take such action as should secure this end. It immediately proceeded to discharge the duty devolving upon it, and, after consultation with the Department of Agriculture, ultimately succeeded in making the Register a tangible and accomplished fact. Care was exercised in regard to the best method of judging, and a standard description and scale of points were subsequently drawn up applicable to a breed which the Society selected to call 'Large White Ulster.'

"The eligibility of animals for registration will, for the present, be determined by the result of inspection; but where a sire and dam have been already duly entered in the register, their progeny, provided it bear no black spot or other equally disqualifying mark, shall not be subject to the rule.

"In order to facilitate the identification of animals registered after undergoing inspection, it was decided to earmark each with the letter 'U,' also a number. That the calling into existence of the Herd-Book has met with the general approval and support of breeders is indicated by the fact that applications were received for inspection of 231 animals; of this number 41 boars and 144 sows, the property of 114 owners residing in the counties of Antrim, Down, Armagh, Monaghan, Tyrone, Fermanagh, Londonderry, and Donegal, were accepted for registration.

"Innovation, although it brings in its train many advantages, is often received with reserve, and doubtless some years will elapse before the majority of owners of pigs in Ulster fully appreciate the enormous advantages

which this system of registration affords; but, judging by the enthusiastic way in which the scheme has already been taken up, there is little doubt that in the near future the breed which makes for the development of a popular bacon pig will undergo rapid improvement and become, as it is fitting it should, an ideal one.

"*The Points of the Breed must be*—Head moderately long, wide between the ears; ears long, thin, and inclined well over the face; jowl light; neck fairly long and muscular; chest wide and deep; shoulders not coarse; oblique, narrow plate; legs short, straight, and well set, level with the outside of the body, with flat bone, not coarse; pasterns straight; back long, level (rising a little to centre of back not objected to); sides very deep; ribs well sprung; loins broad; quarters long, wide, and not drooping; hams large, and well filled to hocks; belly and flank thick and well filled; tail well set and not coarse; skin fine and soft; coat, small quantity of fine, silky hair.

"*Objections.*—Head, narrow forehead; ears thick, coarse, or pricked; coat coarse or curly; bristly mane.

"*Disqualification.*—Any other than white."

The highest numbers in the scale of points are given for the back, sides, hams, and coat.

The fee payable for each entry is 2s. 6d. Entry forms may be obtained on application to the "Secretary, Royal Ulster Agricultural Society, Balmoral, Belfast."

I am indebted to Mr. Robert Bruce, the Agricultural Superintendent of the Royal Dublin Society, for the information contained in the Register of boars and sows suitable for the improvement of pigs in Ireland. The Register was started by the Society in 1900, after consultation with the Irish Bacon-Curers' Association.

At first all pigs entered in acknowledged Herd-Books (which publications had been in existence five years), all pigs imported into Ireland by the Irish Bacon-Curers' Association prior to October 31, 1898, and all pigs not entered in a Herd-Book receiving a prize or commendation at any show held in Ireland where there was a separate classification for either white, black, or brown pigs, were admitted to the Register, providing that the judges at such shows were selected by the Royal Dublin Society, and that the conformation of the pigs was considered suitable for the improvement of swine in Ireland. In 1902 the Register closed by inspection, after which pedigree stock only were accepted.

The following are the conditions of admission to the Register:

FOUNDATION STOCK.

1. All pigs entered, or eligible for entry, in acknowledged Herd-Books in Great Britain, provided such Herd-Books have been in existence for five years.

PEDIGREE STOCK.

2. Any animal is eligible for entry which is the produce of a sire and dam both of which are duly entered in the Register. The sire and dam must be of the same breed.

3. Any animal is eligible for entry if the sire, and dam's sire, and the grand-dam's sire, are all of one breed and are entered in the Register.

4. Each application for entry must be made on the official form, and all particulars required in such certificate must be given.

5. The application must be accompanied by a declaration as to the correctness of the pedigree and other particulars required, as also a certificate from the owner of the sire of the animal to be entered, certifying that the dam was served by his boar, and giving the date of the last service.

6. In cases where the owner is not the breeder a certificate may be required from the breeder before the entry can be accepted.

7. No application for entry shall be entertained until a fee of 2s. 6d. for each animal is paid to the Society. This fee includes the charge for an official certificate of registration containing the registered number of the animal, together with the names and registered numbers of the sire and dam.

8. The Society reserves the right to discontinue or alter any of the foregoing rules, or to add new rules thereto.

9. Entry-forms, etc., will be supplied on application to the "Agricultural Superintendent, Royal Dublin Society, Leinster House, Kildare Street, Dublin."

Cross-Breeding.—It does not fall to the lot of every pig-breeder to be able to breed pedigree pigs. The material may be wanting, and a quick profit desired at little expense. A pure-bred boar from a well-known source ought, however, always to be obtained as a sire, even though he cost much for purchase or hire. First crosses of harmonizing parents often produce progeny hardier, more prolific, and larger in size than their producers. The couplers that are about equal in size, and coming from breeds which have originated from similar sources, effect the best results. By crossing, it is possible to unite many good qualities in a new race, which cannot be implanted to the same degree in the offspring of pure or in-and-in breeders. Careful mating can improve body-weight, size, form, and fattening propensity, and strengthen constitution. Fresh blood is obtained by crossing, and thereby the bad results of consanguineous breeding do not arise. The habits of the swine, size, build, and disposition should agree somewhat. A coarse, large-framed boar, with rustic propensities, put to a refined highly domesticated little mate, will not do: the incongruity will be too pronounced, the blood probably not blend, and the result be grotesque. The best results in cross-breeding are obtained by putting pure-bred

boars to sows of definite breed, and not to mongrels. A good constitution in both parents is eminently desirable, with the sire in good productive condition, with shapely body, firm gait, and quiet temperament; the sow being symmetrical in build—no drooping quarters, narrow loins, or flat sides, but long in body, with a broad pelvis. Good feeders are often good breeders, whilst size, symmetry, and early maturity depend much on appetite. External conditions, such as housing, exercise, warmth in winter, and coolness in summer, should receive due consideration, according to the customary life of the race. Damp, dark, dirty sties never pay. Good grazers by nature should be allowed to graze, and not be kept cooped up always.

Desirable unions are those of—Tamworth-Berkshire, Tamworth-Middle White, Large White-Large Black, Large White-Berkshire, Lincolnshire Curly Coated-Middle White, Small Black-Berkshire, and others. The improved Dorset and Hampshire, the Sussex, and the Gloucestershire spotted pig enjoy good local reputations. The Large Whites have been crossed advantageously with the native breeds of Germany, France, and other countries. The Berkshire has gone to improve the races of not a few foreign lands.

IV

AGE OF SWINE

The adult pig has six incisors in the upper and six in the lower jaw; and seven molars, or grinders, on each side of the upper and lower jaw; and between the molars and incisors the tusks, two in the upper and two in the lower jaw. Between the tusks and the molars are the premolars, or wolf's teeth. The full-grown hog has thus forty-four teeth.

The first set of teeth—milk or temporary ones—are shed as age advances, and the permanent ones, coming later, last through life.

The piglet comes into the world with four corner teeth and four tusks.

The temporary molars are twelve in number—three on each side of the upper and lower jaw—and the premolars are permanent from the first. Temporary molars are smaller than permanent ones, and the third molar has three cusps or points on the crown, instead of two.

At one month old the two central milk teeth are cut, and the three temporary molars are in the mouth, the first one showing through the gum, and the second and third being well up.

At three months old all the temporary teeth are up, the under ones appearing in their completeness at two months, and the upper a month later.

At five months old the premolars are being cut, and the fourth molar—the first permanent tooth—is seen behind the temporary teeth.

The premolars and the fourth molars are expected to be seen in a six-months-old pig. If the fourth molar projects from the angle of the jaw and the permanent corner teeth are through, the animal is past six months old.

The corner milk incisors are replaced by permanent ones at nine months, the centrals or uppers at twelve to fifteen months, and the middles at sixteen to eighteen months.

The permanent tusks are coming through the gums at nine months.

The fifth molar tooth is always cut between ten and twelve months.

Shortly after a year old the temporary molars fall out, and the three anterior permanent molars are in the mouth, and may be known by their sharp, unworn points.

At seventeen to eighteen months the sixth molar is cut.

At the age of two years the lateral permanent incisors are level with the centrals.

In classes at shows for pigs not exceeding six months old the premolars and fourth molar (which is the first permanent one) must be looked for. The absence or presence of the permanent molar is good evidence as to age.

For pigs at nine months the temporary tusks will still be in position, and if fully-developed permanent ones are there, the pig is over nine months old.

The presence of three anterior permanent molars on each side of each jaw shows that the animal is over a year old, as these organs are all in the mouth at the age of fifteen months.

Plate V.

FIG. 8.—UPPER JAW OF A THREE-MONTHS-OLD PIG, WITH NIPPERS, CORNERS, AND TUSKS, AND TEMPORARY CENTRALS JUST COMING THROUGH. (After Ostertag.)

Fig. 9.—UNDER JAW OF A THREE-MONTHS-OLD PIG, SHOWING NIPPERS, CENTRALS, CORNERS, AND TUSKS. (After Ostertag.)

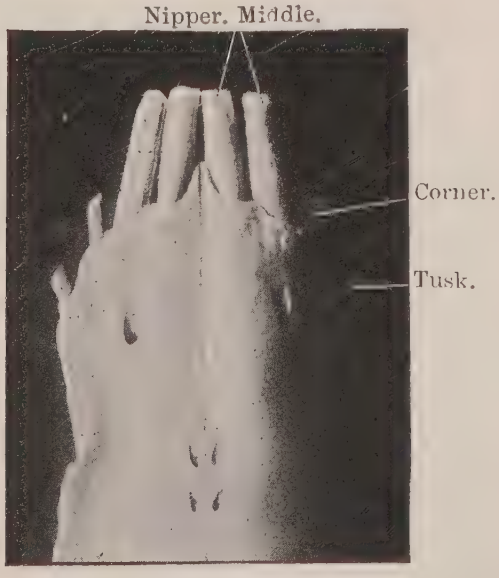


FIG. 10.—LOWER INCISORS (TEMPORARY) OF A SEVEN-MONTHS-OLD PIG. (After Ostertag.)

Plate VI.

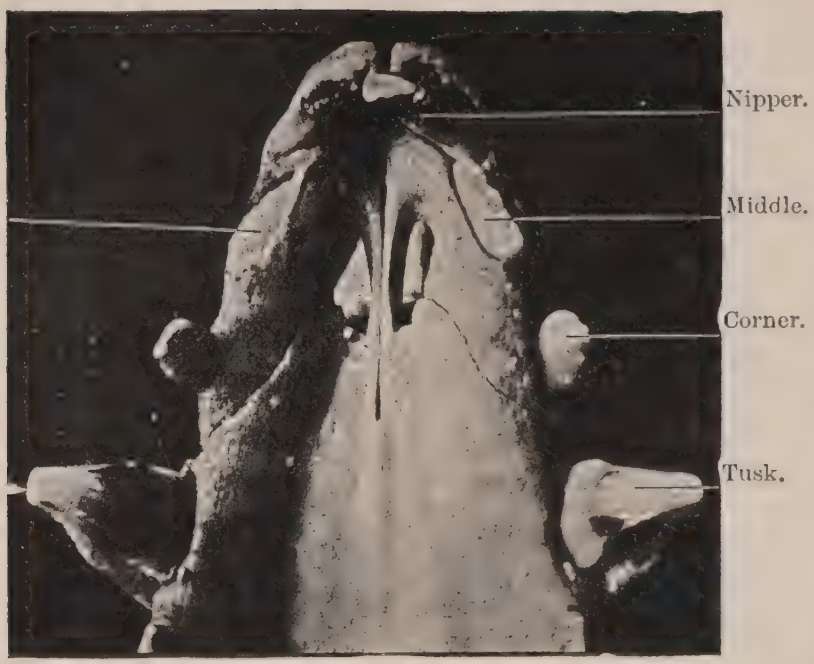


Fig. 11.—Upper Jaw of an Eighteen-Months-Old Pig, showing Permanent Nippers, Middles, Corners, and Tusks. (After Ostertag.)

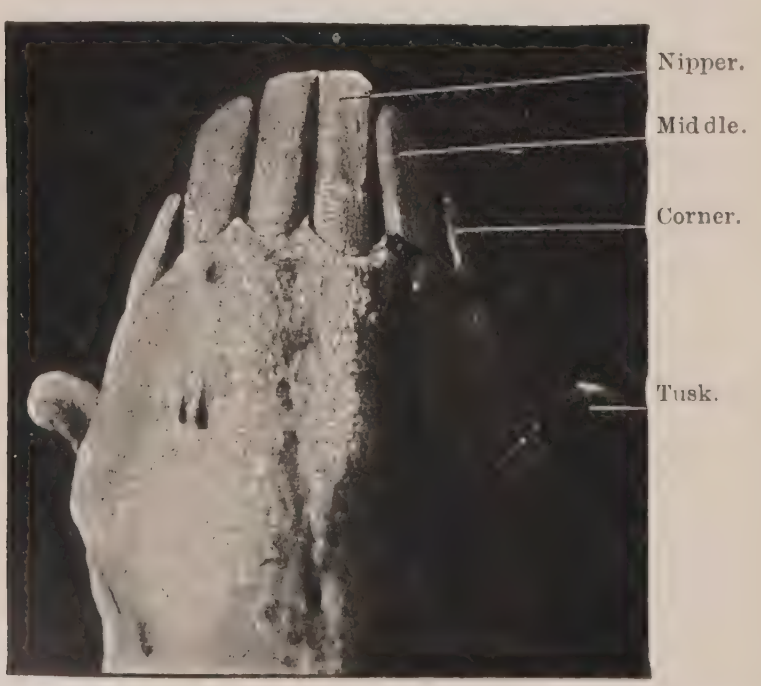


Fig. 12.—Under Jaw of an Eighteen-Months-Old Pig, showing Permanent Incisors. (After Ostertag.)

V

THE BOAR

The choice of the sire is very important, and demands much care, because, although both parents impart their attributes and body-form to their progeny, yet the greater influence in the transmission belongs to the boar. The purchase of a male from a stranger, dealer, or unknown source does not recommend itself to the astute buyer. A well-known man with a good reputation will supply the best stock-getter. A trip to the owner of a boar and observation of a service will repay the trouble. A pedigree sire is at all times desirable, with quiet disposition, efficient procreative power, and a likelihood of putting on flesh economically. Prolific ancestors as regards both parents are a recommendation, as capacity to breed large families is a transmissible quality.

Sound constitution; a strong, wide back; masculine, broad head; fine-boned legs, with large articulations, put firmly down and well stood on—in fact, a uniform level and proportionate body—are points to be looked for.

A narrow-chested, weak-loined, flat-sided, leggy animal with a defective forehead, hesitating and uncertain in his gait, with legs set on anyhow, will never do. Fine silky hair, covering the whole body well, and thick about the eyes and claws, a gainly carriage, and lively demeanour, all denote quality.

Of course, the testicles of a prospective master of the harem will be noted. Large enough in size, moderately

Photo, G. H. Parsons.

FIG. 13.—TAMWORTH BOAR: BISHOP OF KNOWLE.
Owned by Mr. Ibbotson, The Hawthorns, Knowle. First, Bath and West Show.

Photo, G. H. Parsons.

FIG. 14.—MIDDLE WHITE SOW.
Owned by Mr. J. G. Williams, Pendley Manor, Tring. Winner of many First Prizes.

soft and yielding to the feel, will be right, and these should be placed in a tense scrotum. If flabby and large in proportion to the breed, they may be watery, poor procreative organs; and if small and hard, contain no living seed. A lively lord, showing masculinity, energy, and strength, is better than a sleepy, phlegmatic sire; one that shows "the lust of the flesh and the pride of life" in presence of a sow that wants attending to is the choice for the purchaser or breeder. Broadness between the ears and eyes shows intelligence and good temperament. If the male is a little bigger than the female, it will be a good point; and if smaller, he will need to be well made, symmetrical, and strong.

Strong boars impart vigour to the progeny of weak sows, but delicate sows do not produce the best youngsters.

Strong nourishment, judiciously given, and not of a fattening nature, like maize, is the feeding rule. Strong, straight, fine hocks and taut fetlocks withstand the strain of the covering season well. Good condition, not too fat or thin, and an eager appetite, which easily develops a well-made body, are economical considerations.

Exercise in the open air, roomy quarters, and a handy water-bath, will reinvigorate the sire in the breeding season. One service at a time is sufficient; two immediately and successively are to be deprecated, and forty to fifty jumps a year are enough.

An adult male transmits his characteristics more assuredly than a young sire; the best qualities will usually be seen in the progeny of parents neither too young nor too old. An old boar is an unprofitable animal from a breeding point of view, and after three or four years' use should be fattened and sold.

The sire needs kind treatment, must not be beaten, thrashed, or teased by children or servants.

The number of well-known breeders of pedigree animals ought to make first-quality sires easily obtainable; and even if one does not want progeny to figure at shows or in the Herd-Book, there is satisfaction and profit in the facts that good disposable animals will be produced, and the name of one of the parents figure in the pigs' nobility list.

The health of the boar must be constantly watched over. Too often he is found in a neglected, dirty state in some out-of-the-way place of the homestead. If he is to get good stock he must be kept in good form, and if any insidious disease attacks him, he may spread the malady among neighbouring herds or his own co-mates, and cause trouble and mischief. Always remember that he is worth his salt, and do not neglect him even if he is not always working at high pressure.

VI

THE SOW

The breeding-sow will be wanted to produce healthy young, which grow well. The more of this class she gives birth to, the more profitable she will be to the owner. The choice of the soon-to-be mother from a litter will be the well-grown member—a good eater, with a long, broad body, deep sides, wide hips, fine bone, roomy loins, and twelve or more well-developed teats. An indication of fruitfulness is afforded by the number and development of the mammary appendages. Nature in animals makes good organs for effective use, and a sufficient number of well-shaped, equal-sized mammæ denotes a dam destined to give a plentiful supply of milk for a quite-to-be-expected numerous progeny. Wide girth in the middle of the body-piece shows that the best teats may be expected to be well supplied with lacteal fluid. Prolificacy in pedigree sows can, of course, be judged from the Herd-Book.

To illustrate the value of *one youngster one teat*, a little tale related here may not be out of place:

A certain tenant went one day to pay the rent to his landlord. On arrival at the house of the latter, the family were having dinner. The maid showed the rent-payer into the room where the repast was being partaken of. After a few preliminary remarks on the weather, crops, and agriculture in general, and no present offer of hospitality, the topic of conversation changed to pigs,

and the tenant remarked that one of his sows had just had a litter of thirteen youngsters. "Dear me!" said the landlord, "whatever does the thirteenth one do?" "Do?" replied the tenant. "Why, as well as he can; but mostly he be doing what I be now—he do sit still and watch the others feeding."

Nervous, excitable, restless females do not make good mothers; a quiet, placid temperament is to be desired. Leve llitters are important. Not infrequently a weakling, that appears to have been made in a hurry when there was a scarcity of stuff, comes along. Individual mothers too often guilty of this sort of thing ought to be dispensed with. If it occurs in many sows covered by the same boar, the guilty party will be sufficiently indicated. Hair on the bodies of good reproducers and their offspring should be fine, glistening, and plentiful. Defects of jaws, heavy shoulders, short, thick necks, narrow loins, short backs, are faulty points.

A breeding sow from a first litter is an indifferent speculation, usually not strong and hardy, with a tendency to throw weakly youngsters, not well formed. The wise selector will choose a madam well fleshed, but not too fat, for fatness and prolificacy go not hand-in-hand. A steady, straight, level gait, limbs well set on and used correctly, betoken the useful, profitable dam.

There has been, and is now, a great tendency among breeders to somewhat overlook the qualities and advantages of good female stock. The sire must be perfect, but a few imperfections in the dam do not greatly matter, so they argue.

The man who takes the most pride in the breeding art will look to the characteristics of *both* parents. The good sow should be at least a third more than her height

in length, with a head of medium length, a broad, level, not drooping back, and if slightly arched, so much the better; the width of the chest about half the height of the animal, the depth somewhat more; the pelvis as broad as the chest; the limbs well made, not too coarse and perpendicular. Narrow-placed limbs are faulty, as also long, oblique fetlocks. Twelve teats should be present. The skin must not be too thick, and covered with fine, long hair. In white swine the skin should be a rosy colour, movement free, and neither stiff nor unsteady. General appearance: Keep in view evenly proportioned body, growth, early maturity, constitution, and temperament (Dr. C. Nörner).

The boar exercises the greater influence as regards external form in his descendants, whilst stamina, constitution, and digestive capacity are characteristics transmitted by the mother to the progeny.

The capacity for milk-giving of sows is important. Mother animals, bred carefully from good milking dams, feed their litters best, and the progeny can be then weaned at an early age and carried on without halt.

Experiments in America by Professor Carlyle showed that a Berkshire sow gave $11\frac{1}{2}$ lbs. of milk in twenty-four hours. The fluid was drawn at ten different periods, being the number of times the litter suckled in the above-mentioned space of time.

The experiment made with a dozen sows showed that up to the commencement of the eighth week dams gave a good supply of milk; but as this time was elapsing the flow declined, and from 11 lbs. per day fell to $5\frac{1}{2}$ lbs., and afterwards to less than 4 lbs. One sow, of no particular breed, produced $1\frac{1}{2}$ lbs. of milk per day during the eighth week, and on the following day only $\frac{1}{4}$ lb.

At the tenth week they practically failed to produce milk.

The American experiment showed that sow's milk contained 50 per cent. more solids than cow's. The percentage of fat was 6·6 to 7·25.

Pure-bred dams produced 136 and 176 lbs. of milk the first week after farrowing, and a common sow of no fixed breed 144 lbs. As was already known, it was found that certain teats—namely, those at the widest girth—gave more milk than others.

VII

BREEDING, OR REPRODUCTION

THERE is an art in satisfactory breeding, a good knowledge of which is often only obtained by long study and close observation. Rule-of-thumb procedure, or a mere understanding of the fact that "one and one may sometimes make more than two," or that if a boar is put to a sow, pigs will be produced, will not satisfy the enthusiastic breeder. He will get to know all he can about qualities likely to be transmitted from parents to progeny; he will see to it that both reproducers are in good health, suitably fed, and of right stamina. His experience in the practical procedure of obtaining profitable litters will ripen as years pass on; but even when he knows about points, right fleshing, and prolificacy, if he is an inquiring man, he will want to know how reproduction is accomplished, and will be interested in the physiology of the question. It is the union of the male and female cell, their subsequent nourishment, division, and growth in the womb of the mother, that account directly for all animal life; consequently, the hostess should be well fed, as in swine about 3 per cent. of the body-weight represents the nutritive matter yielded to the fœtus by the dam (Leuckart).

The secretion of the healthy male genital glands contains the spermatozoa, or tadpole-like bodies, which bring about fertilization of the ova, derived from the ovaries of the female.

The testicles of the boar, large and spherical, contained in a tense bag, or scrotum, furnish the seminal fluid, and may be seen and felt in the perineal region of the male. When the sire mounts the dam in the covering act, the spermatic fluid is passed from the round organs into two small pouches, called seminal vesicles, and from these receptacles, furnished with highly muscular walls, it is forced along or ejected from the canal of the long, thin penis, or male organ of copulation, into the uterus, or womb, of the female. Here it meets with little round bodies (the ova), about $\frac{1}{200}$ inch in size in the pig, which have come down into the womb by the passages leading thereto from the ovaries at the period of rutting. The ovaries are lobulated structures, situated behind the kidneys, in the region of the loins. The female cells liberated from these lobulated organs do not all descend at one time into the womb, but are evolved one after the other; hence the value of putting the sow to the boar at the end of œstrum, when all the eggs are in the nest, as it were. In races of swine not very prolific the middle of the heat is believed to be the best time. Healthy living spermatic fluid contains tadpole-like bodies, called spermatozoa, and these, meeting the ova in the womb, penetrate the former with their heads, lose their tails, and the first step in the production of pork or bacon has occurred—the sow is impregnated, or "in pig." Very early in life swine are able to procreate their species—in precocious races at four or five months. Boars and sows when well fed may be advantageously coupled at about nine months; thus it is suitable to choose reproducers from litters born in spring or early summer. Many breeders use the sire when he is seven or eight months old, and in well-bred races the dam is

often only six to eight months of age when she is served. At nine months the male can serve three sows a day; when twice as old he may cover five. One male will suffice for forty or fifty females, and he will satisfactorily accomplish the jumping of these in a year.

Before animals are used for breeding they should be sufficiently grown, have had plenty of exercise, and possess, especially on the maternal side, a good supply of muscle. At least two hours should elapse after a service before a boar is used again, in order that his store of seminal fluid may be replenished. The sow is usually taken to a small court or the boar's dwelling to be served. It is unwise—at any rate, in this country—to let the boar run with the sows; he wastes his strength by unlimited services, produces poor stock, and gets out of control, wilful, and wayward. Heat, or being in season, lasts from one to three days, and reappears in non-pregnant females every nine to twelve days, or month, and, as we have noted, it is at the end rather than commencement of the process that satisfactory coupling results will ensue. The observer may always see indications of rutting, or " coming in season "—at one time perhaps very pronounced, at others only slight. The lips of the vulva or vaginal orifice swell, the sow is restless, does not eat well, voids urine frequently, grunts and shrieks about, comes to the door of the sty to get out. If other sows are present, she will jump them, and if at liberty on the pasture will seek out the boar.

Connection, copulation, or the covering act, generally lasts about ten minutes in porcines; and where weighty boars are used, " travails," or " travises," are sometimes employed by breeders. They allow close coupling of the animals, and prevent the putting of too much strain

on the sow or the pushing of her about a lot during copulation. These miniature stocks support the female anteriorly, laterally, from underneath, and have an adjustable platform at the back for the boar to stand on, by which his hind-part can be raised or lowered to the most convenient height, and a straight service procured.

Free exercise, as at pasture, helps the regular occurrence of heat; breeding strength is always hindered by a fat state, or that feeding which tends to make adiposity. Monsieur Ayraud, a noted French breeder, gives the following rations as an example of daily food for a pregnant sow weighing about 220 lbs.:

	Lbs.
Cooked potatoes	about $2\frac{1}{2}$
Cabbages, carrots, or turnips.. ..	,, $6\frac{1}{2}$
Butter-milk	,, 13
Bran	,, 2

The good boar should go about his work quietly, eagerly, and not too hastily; when mounted, he should exhibit plenty of energy. If too anxious and hurried in his actions, he will probably be an unsatisfactory stock-getter; but that amateurish ways decline with a modicum of experience is a well-known and observable fact in most producers.

Proximity of males and females—*i.e.*, where they can hear and occasionally get a sniff of each other—helps coupling inclinations. Young sires make the best mates for juvenile dams coming on heat for the first time. The male organ of an old hand may be a bad fit (too long or too big) for a very young sow, and cause her much pain during and after the jumping act. It not unseldom happens that where boars run at liberty with sows two different males may serve the same female (likely to

happen where pigs are kept under less control than in these isles)—needless to say, with unsatisfactory results, colour, size, and number of the litter varying. Old phlegmatic sows require lively young boars, and frisky females steady, quiet sires. The aim of all scientific breeding should be to produce a profitable, healthy animal, acceptable and pleasing to the butcher and consumer. Prolificacy and the mere obtaining of large litters, intimately bound up with the question of profit, do not always lead to the finest specimens being brought forth, and really good breeding and zootechny are often at variance with the simple production of numbers.

"In the third or fourth week of pregnancy in the sow the head, body, and limbs of the embryo can be distinguished. From the fourth to the sixth week the fœtuses attain a length of $1\frac{3}{4}$ inches; from the sixth to the eighth week, 3 inches; from the eighth to the tenth week, 5 inches; from the eleventh to the fifteenth week, about 7 inches; and a newly-born pig, say a fortnight later, measures about 9 or 10 inches in length."*

Mr. M. J. Rowlands, M.D., Nash Farm, Keston, Kent, gives some interesting particulars as follows: "I keep a herd of pedigree Middle Whites. After three months old the average weight of six young gilts bred and reared on the open-air system was 100 lbs. At four months old the average weight was 145 lbs. At five months old the average weight was 170 lbs. At seven months old the average weight of eight pigs weighed was 210 lbs. These pigs had in no way been pushed on, as they are not intended for slaughter, but for breeding purposes. A few gilts that we have pushed on and were to-day five months

* "Veterinary Obstetrics": G. Fleming, C.B., LL.D.

old averaged 190 lbs. This for Middle Whites I consider excellent. My average is nine per litter from gilts, and just over 12 per litter with sows, and some are extremely prolific, and litters of 17 and 15 are quite common.

"As the result of various experiments with crosses, I found that they were not as good as the pure bred Middle White, did not mature as quickly, and ate more food for the amount of weight they put on. The results of my investigation definitely proved to me that taking into consideration the amount of food consumed, the Middle White pig was most capable of converting this into pork at the cheapest rate. One of my gilts weighed at three months 138 lbs., at four months 174 lbs., at five months 194 lbs. It will be seen that in two months the pig added to its weight 56 lbs. I do not think a sty pig could be got to develop at this rate."

VIII

A. GESTATION—CARE OF THE PREGNANT SOW

The duration of pregnancy in the mother animal varies somewhat, according to her breed, early or late maturity, and feeding. Age and condition, too, will have their influence on the length of time that young are carried. Old sows, those in poor condition, and refined races, often give birth early. Young, vigorous, strong dams may go some days over their time, whilst those in good breeding condition and suitably fed give birth to their progeny from the one hundred and twelfth to the one hundred and nineteenth day.

Rainard noted the period of pregnancy in sixty-five pigs, and reported as follows:

2	instances	104 days
10	,, ...	110 to 115 days
23	,, ...	116 to 120 ,,
21	,, ...	121 to 125 ,,
2	,, ...	126 days
1	instance	127 ,,

The average was 119 days, and the interval between the longest and shortest periods 23 days.*

It is not possible to tell immediately whether a sow is in pig; but cessation of heat, or rutting, increased appetite, rejection of the advances of the boar, a tendency to lie down and avoid companionship, greater docility, all tell the tale of approaching motherhood. The first half

* "Veterinary Obstetrics": G. Fleming, C.B., LL.D.

of gestation over, the circumference of the body becomes greater, madam moves about carefully, and the inside passengers may be felt through the abdominal walls.

A few weeks (generally about three) before birth of the youngsters occurs the neighbourhood of the teats and the appendages themselves increase in size, and may be seen in two well-marked ranks, and a fortnight before the time of the act of deliverance milk appears in the mammæ, their points become rosy or congested; then the vulva swells, reddens, and slime (mucus) is discharged.

Care in feeding the in-pig subject will be indicated by not giving too much bulky or strong food, but a laxative, nutritious diet. The last point is worthy of remembrance, as the young take up much nourishment from their hostess; and if not sufficiently and suitably fed, both they and she will suffer. The ration of food may be increased with advantage in the sixth to eighth week of pregnancy, for the mother's body requirements must be satisfied, and, moreover, two other points kept in view—viz., nourishment of the inside passengers, and the production of a prospective good supply of milk for the progeny when they arrive.

Exercise out at pasture is indicated for breeding sows, the laxative diet procured overcoming any tendency to constipation, not unseldom present during gestation; besides, the movement in the air aids respiration, digestion, and circulation.

All food given must be good in quality. Potatoes and corn go well with grass. Turnips, mangels, beetroots, carrots, steamed potatoes, and meal furnish variety enough in winter. Stalled swine will be benefited by lucerne, vetches, clover, or other green provender brought to them. Warm food is much relished in winter-time.

Pollard, sharps, bran, and good-quality wash may be given. As sows advance in pregnancy little and oftener should be the rule as regards feeding, and a few weeks before parturition four meals a day served *punctually* is good practice.

Clean, warm, comfortable, and sufficiently roomy quarters make the best domiciles for farrowing porcines.

In the winter housed swine do well if let out in the court, or allowed to have a run in the straw-yard when this is unoccupied. Pregnant subjects need quiet, kind treatment, and ought not to be run or chased about.

Sows roaming free must be brought in when near the time of farrowing, and, like housed swine, have plenty of litter—which may be advantageously short cut—given them to make their nests, so as not to hide the little ones and cause them to be overlain or crushed when they appear. Straw litter, cut 8 inches long, makes excellent bedding for swine.

B. PARTURITION, OR FARROWING

Labour pains are the immediate signs of impending birth. At first rather slight and preliminary, they develop later on into strong, true throes, convulsing the whole porcine frame. Sows with their first litter show the preparatory movements of straining most plainly. Lying down and getting up, ever restless, voiding dung and urine frequently, the mother evinces the usual anxiety of her sex at this time. Strong labour heaves, evidently accompanied by a good deal of pain, and with the dam lying on her side, force the first youngster into the world. At intervals of about ten minutes other new arrivals make their exit, or there may be a quick birth of

two of the progeny, and then a delay of one or two hours before another appears. The mother shows her cleanly habits by changing her position during the act of parturition, and by so doing enables each of the new arrivals to be deposited on a clean place. Each member of the litter, coming head or hind-feet first, is usually accompanied or followed by the fœtal coverings attached by the navel string; lying quiet for a time, the juvenile turns on the pelvis, breaks the cord, and creeps round to the teat of the mother. After-pains come on in about half an hour following the birth of the last member of the litter, and these force out the afterbirth, which should be at once removed and buried.

Sows have occasionally been known to come on heat when pregnant by one sire, and to be served by another. In cases of this description two litters have been brought forth at an interval of three or four weeks. Dead members of a litter are not infrequent. The causes of this misfortune may be ascribed to too close relationship in breeding, too fat a condition during pregnancy, and the giving of mouldy or decomposed food. Careful removal of dead fruit is very important.

In the throes of labour the newborn may be crushed or injured—a calamity which is avoidable by removing them as they come forth, keeping them apart from the dam until deliverance is complete, and returning them when she is quiet, clean, and easy.

The bad habit of eating their progeny which some sows are addicted to is said to be due to spite against the youngsters for the pain their exit into the world causes the mother, to leaving dead juveniles or the afterbirth in the sty, to insufficient lime-salts in the food, to desire for flesh and bone diet (hunger through lack of

suitable food), to injury to the mother's teats by the pointed teeth of her family. Anybody who puts the finger into the mouth of a young pig will easily feel these sharp teeth. Decoctions of coloquintida or juniper-berries rubbed on the bodies of the little ones is said to be a preventive of this depraved act. There is no doubt that in some sows there is marked irritability and excitement at the time of parturition, and the maternal instinct is deranged and possibly a transitory dementia may account for the hatred of and injury to the young.

When the members of the family are more numerous than the number of the teats, a foster-mother who will take to them, and who may have more mammæ than family, may possibly be found; otherwise, first loss is the best, and the weediest members of the throw must be sacrificed.

There is a difference of opinion among breeders as to whether swine giving birth to their young should be attended or left quite alone. Greatly housed, carefully tended, and highly domesticated swine often seem to appreciate the presence of the regular attendant. Meddlesome, unnecessary interference is always to be deprecated, but quiet, trustworthy supervision is valuable, and may prevent loss and accident, for all the happenings of births are not straightforward and uneventful, although most of them proceed normally in animals.

To wipe the piglings immediately after birth with a clean cloth, put them to a teat for a short time, and then into a dry, warm place until all the family have arrived, is good practice if the parturition is not a prolonged one. Warm or cold bran gruel, sloppy sharps or middlings, buttermilk, meat broth, may be given for three days after parturition, and if constipation be present, a dose

of castor oil, or four tablespoonfuls of sulphur and half a tablespoonful of nitre, may be given in milk or gruel. A little walking exercise twice a day will help the mother to have a movement of the bowels; each day she will benefit by this procedure, being free at the time from the worry of her family, and combating stiffness and cramp in her own limbs.

At a month old the little pigs will begin to feed themselves. A small trough in a miniature hut which the mother cannot enter will be good furnishings for them. A modicum of green food suits suckling sows, and skim milk is excellent food for both mother and litter.

It is good management to try and get the members of the litter to feed a little themselves as early as possible, as each week that passes after the first month puts visible strain on the sow in the matter of milk-drain and condition. A sprinkling of corn in the sty will be eagerly picked up by the youngsters when they begin to fend for themselves.

IX

FEEDING

It is surprising how many men who hesitate to express an opinion on matters with which they are not practically acquainted will yet be dogmatic in their statements and cocksure in expressing judgment on equine qualities. However little they may have been mixed up or connected with horse matters, they still think that they know a good steed when they see one. Probably a greater number of people imagine that any sort of food is good enough for pigs, and that porcine feeding is a simple matter. It is only a close acquaintance with both subjects that shows the self-confident one how much there is to learn concerning them. An animal of apparent beauty probably has hidden defects unrecognized and unperceived by the poser in knowledge, whilst bad and wrong feeding may kill the porker or baconer, and cause the pig-keeper's balance-sheet to come out on the wrong side. Experience in these matters often humbles the self-assured individual, and may cause him to perceive the prominence of the vein of wisdom in the saying that "the fool thinketh himself a wise man, but the wise man knoweth himself to be a fool."

It is true that the pig is an omnivorous animal, eating almost anything from apples to coal, from meat to middlings; but that the subject will grow fat economically, produce fine flesh or well-developed progeny on just any sort of diet, is quite a mistake. Many porcine deaths

may be undoubtedly ascribed to an injudicious supply of food, whilst not a few others may be put down to bad, faulty, or coarse nutrition.

Before one understands how a watch goes and keeps time, one must know something about its works, and not be content simply to see the wheels go round; and before anyone has a good, reliable knowledge of pig-feeding, they ought to be acquainted with some information about the internal organs of the animal which deal with and digest the food.

Seizing and taking up their provender by the mouth, swine do not chew or masticate their victuals much, unless the substances acquired or provided are hard; otherwise what is taken quickly passes from the mouth to the stomach. The latter organ in porcines is a single apartment, into which food arrives, for the most part incompletely masticated and insalivated. It is capable of holding about 12 to 14 pints when full, and it is on the effective action of this organ and the rather long intestines (about fourteen times the length of the body) that the subsequent digestion and assimilation of food, which incidentally makes pork and bacon, depends. Nutriment remains some time in the stomach of a pig; consequently great quantities of aliment, especially of a coarse nature, are inadvisable, and time should be given for one meal to be assimilated before another is put down, and this cannot occur until the greater part of the feed has been dealt with by the stomach and passed out into the intestine. A French observer, Monsieur Colin, gave about 4½ lbs. of raw meat to a pig, and found about 1⅓ lbs. in the stomach six hours afterwards. Another experimental animal received about 4½ lbs. of sop composed of bread and meat moistened, and fifteen hours after-

wards about $2\frac{3}{4}$ lbs. were found in the maw. These facts show that large quantities of albuminoids are digested with difficulty by swine. Not so with foods rich in hydrocarbons and starchy matter, which are well absorbed.

Perhaps nothing is assimilated or incorporated into the animal system so well or quickly as cooked potatoes and maize by the pig, and they contain maximum quantities of starch and fat respectively. Not that maize feeding is greatly recommended here. The grain is only quoted as being quickly assimilated.

Proceeding now from generalities to more particular matter, we will try and indicate the main outlines to be followed in profitable pig-feeding, due regard being given to the ultimate aim and end of the operations; not forgetting, also, the maintenance of a healthy state so far as this in the animal is indicated by freedom from disease.

1. **The Rearing and Weaning of Piglings.**—Mother's milk satisfies the wants of the litter for many days. If the dam has a good supply, the youngsters will grow apace and thrive on the liquid nourishment. In order that the family may sizen levelly, the weaklings or undergrown ones should be put to the best fountains whenever possible, and these, as we have indicated, are generally at the widest girth of the mother, and forward placed. Where a sow is a poor milk-giver a little warm cow's milk may be provided for the youngsters to help them on. Monsieur R. Gouin recommends that piglings brought up on the artificial teat should have liquid nourishment composed of—

$1\frac{3}{4}$ pints of warm cow's milk.
2 raw eggs.
2 teaspoonfuls of sugar.

If diarrhœa occurs, decrease the quantity of sugar; if constipation supervenes, increase it.

The composition of sow's milk is about as follows: Water, 82·37; solids, 16·73; albumen, 6·09; fat, 6·44; sugar, 4·04; salts, 1·06. The quantity of fat in the fluid may vary between 4 and 7 per cent., according to German observers. Thus it may be twice as rich as cow's milk, the lactose about the same, and the albumen 1 or 2 per cent. more than in bovine produce.

A sow about 375 lbs. in weight will give 7 to 14 pints of milk daily (Nörner).

At the third or fourth week the litter may be induced to feed themselves if a little warm milk is taken to them twice a day when the mother is out of the sty stretching her legs and recuperating herself. Only milk sufficient should be given to be cleared up, and later on a little barley meal, or bran, and boiled potatoes may be added to it. Gradually accustoming the youngsters to do with less suckling, one may let them imbibe twice a day, and then once at about the sixth week, and at the seventh or eighth, according as they progress, separate them.

Youngsters that are backward in growth and weakly may be left with the mother longer than those that are strong and well-grown. When weaning, much care is necessary as regards feeding, and the little creatures often seem to halt in their growth at this time. Their digestive powers are not yet very strong. Thickened warm milk or good-quality wash made to the consistency of gruel suits well. Little and often (four meals a day) is the order, and the meals eaten up and trough cleaned out between each feed. Exercise and warmth are good for little pigs, and if they can creep into straw litter, so much the better.

Dry barley, crushed or whole, may be given to little pigs. It is said that whole grain helps in the eruption of the teeth. The earlier youngsters commence to eat a little the better. A small quantity of coarse crushed barley may be given them at eight days old. A little sweet lukewarm whole milk helps them on after they are a fortnight old.

Milk, either skimmed or, if it can be afforded, whole, with barley, wheat, maize, pea or oil-cake, meal, sharps, bran, steamed potatoes, with a little fine coal, are foods from which a varied weaning diet may be chosen. It should not be forgotten that when suckling the youngsters could feed almost when they liked. Regularity and no sudden changes of food are therefore indicated at weaning time. Milk is almost a necessity then, and it should enter largely into the dietary of youngsters just separated from their mother.

At about three to three and a half months the question may be considered as to whether the pigs are to be used for bacon, pork, breeding, or sale.

2. **Bacon Pigs.**—Pigs for fattening may be placed in separate compartments in small groups of two, four, six, and so on. The nature of the food given will depend to a great extent on neighbourhood or district, means of the owner, time of year, and facilities for obtaining a suitable and reasonably priced nourishment. Agricultural residues, brewers' grains, wash, meals, cooked potatoes, skimmed milk, and in early days lucerne, vetches and clover, may be used. When the weather is cold, warm food is much appreciated. A varied diet, nutritious and easily digested, preferably cooked, and with material in it aiding assimilation, is desirable. The cooking of potatoes always makes them more nutritious

as a porcine food. At first a feed given, such as barley meal, sharps, and skim milk, or barley, wheat, and maize meal in equal proportions, and milk, should be thin in consistence, then gradually thickened until given as firm as well-boiled porridge, so that at five months old three-quarters of the mixture given may consist of meal. Carrots have been greatly recommended as a food for baconers.

There is a difference of opinion as to whether pigs intended for bacon should have a fair amount of exercise or not. We think that plenty of movement in early days and a moderate amount later on is good for the quality of the muscular tissue, which is one of the desired points in good bacon.

Bacon pigs weigh, as a rule, from about 140 to 300 lbs., according to breed, but carcasses of about 200 lbs. weight sell the best.

At about seven or eight months, and occasionally a year, the fatting of a bacon pig should be concluded.

Mr. James Long, in "The Book of the Pig," gives the following rations for young swine:

(*a*)	Cooked potatoes	2½ lbs.
	Skim milk wash	10½ ,,
(*b*)	Cooked potatoes	4 ,,
	Barley meal	½ lb.
	Wash	7 lbs.

Monsieur R. Gouin, in his book on "The Rational Feeding of Domesticated Animals," quotes the following rations for fattening pigs weighing about 150 lbs.:

(*c*)	Boiled carrots	about 13 lbs.
	Buckwheat meal (barley meal may be substituted)	,, 1 lb.
	Skimmed milk	,, 7 lbs.

(Dumont.)

(*d*) Cooked potatoes	about	4½ lbs.
Carrots	„	4 „
Wheat or bran meal	„	1¼ „
Skimmed milk	„	2 pints
Wash	„	2 „

Mr. Sanders Spencer recommends boiled potatoes and parsnips mashed and mixed with barley meal as an excellent food for bacon hogs.

3. **Porkers.**—Where milk is prevalent and young pigs get sufficient in their food the best pork is produced. When two or three months old, fattening may be pushed along, and meals given three times a day at regular intervals. Plenty of time is thus allowed for sleep and digestion. Barley, rice, and maize meal, potatoes, and milk form staple foods. Thin, sloppy diet is best for porkers, and only at the last stage should it be made thick. Less exercise is, perhaps, desirable for this class than baconers, and as soon as fattening commences the subjects should be brought into the sty. Young, tender pork is at all times wanted, and butchers and consumers like it not too fat.

Much quality will be shown in a good subject, such as thin skin, fine-grained meat, nice-sized bone, and a fair proportion of lean to fat in the carcass. The weight of a porker will vary with the race; in some parts of the country joints will naturally be much bigger than in others.

The animals are, of course, sold and killed younger than baconers, a lot of them being slaughtered at Christmas time, usually at four or five months old.

Carcasses may weigh from 3 or 4 to 17 or 18 score, but, relatively, the small meat is the more profitable and saleable.

Warmth is of great importance in fattening operations, and it has been shown over and over again that warm pens furnish better results than cold ones. In some cases a pound less food per pound of pork produced has been registered in favour of the warm-housed subjects.

Animals kept too cold will often furnish soft, flabby, and greasy carcasses.

The food given has an influence on the quality of pork and bacon.

An entire meal ration of rye, barley, wheat, or oat meal, where no milk is used, produces faulty flesh. Green crop and roots overfed also cause this defect. Food given in too fluid a state goes through the intestinal canal too quickly, and adds little to the blood and tissues of the system, because little nutriment is assimilated. A judicious balancing of the ration is desirable, and as a rule not more than a third should consist of the meals. Pigs not fully matured and slaughtered too early, not well fattened, often possess adipose tissue in their carcasses that will not set. Beans and peas, if given too largely, will cause soft flesh.

The Ministry of Agriculture and Fisheries suggests the following rations for fattening pigs:

For pigs of 40 lbs. live weight:

½ lb. middlings	or 1 lb. sharps.
½ lb. gluten meal	½ lb. middlings.
½ lb. rice meal	⅛ lb. fish meal.

For pigs of 80 lbs. live weight:

¾ lb. sharps	or 1¼ lb. sharps.
¾ lb. bran	1¼ lb. middlings.
¾ lb. gluten meal	¼ lb. fish meal.
¾ lb. rice meal	

For pigs of 140 lbs. live weight:

1½ lb. sharps	or 1¼ lb. sharps.
¾ lb. bran	1¼ lb. middlings.
¾ lb. gluten meal	1¼ lb. rice meal.
1½ lb. rice meal	½ lb. fish meal.

For pigs of 180 lbs. live weight:

2 lbs. sharps.
1 lb. bran.
1 lb. gluten meal.
2 lbs. rice meal.

Another table that may be used is as follows:

For pigs of 25-60 lbs. live weight:

¼ lb. bran	or ¼ lb. fish meal.
¼ lb. coconut cake or linseed cake meal	¼ lb. maize gluten.
½ lb. sharps	½ lb. sharps or bran.

For pigs of 60-100 lbs. live weight:

¼ lb. middlings.
¾ lb. dried grains.
½ lb. palm-nut cake, coconut cake, or bean meal.
¼ lb. fish meal.

For pigs of 100-180 lbs. live weight:

1 lb. maize or fine middlings.
1 lb. dried grains.
1 lb. palm-nut cake, coconut cake, or bean meal.

Palm-kernel cake and palm-kernel meal may be safely used as food for pigs in proportions up to about one-third of the total ration.

4. **Store Pigs** do not require to be kept fat, but they should be maintained in good condition, as it must be remembered that growth is favoured thereby. The food should be low enough in quality not to make fat, but sufficient in quantity for the pigs to satisfy their appetites. Where pasture is present, stores may be

economically brought up and allowed to roam about to their hearts' content, provided there is a place handy to run into out of the cold and wet, and to give the pasture an occasional rest. They keep in health while grazing and foraging about after acorns and beech-nuts, and digging up a root here and there is only what Nature intended.

Where no grazing can be conveniently given, green clover, lucerne, and vetches may be brought to the animals. The good position of the average French farmer as compared with his English neighbour is ascribed in no small degree to his use of lucerne, and undoubtedly he has a good and valuable pig food at hand in this forage. There is no doubt that exercise at pasture greatly benefits the health of pigs, and if the feed be good, they grow well and put on a nice quantity of flesh.

In Germany store swine are often turned into fields of red clover or lucerne, and do exceptionally well thereon. Where green food is present, it can easily be understood what a saving can be effected in the bringing up of store swine compared with the case where neither grazing nor green food can be obtained (see Chapter IX.).

5. **Breeding Swine.**—Some notice has been given to the feeding of reproducers under the headings of The Boar and The Sow.

Grazing and its resultant benefits, directly and indirectly, on the mother animal in the pregnant state cannot be overestimated. In-pig sows are living under the conditions best where they can have a run out at grass and receive a little concentrated food night and morning. Mr. James Long, in his "Book of the Pig," gives the following winter rations for breeding sows:

	Lbs.
(*a*) Potatoes	6
Carrots	1
Barley meal	1
Wash	18
	26

	Lbs.
(*b*) Potatoes	3
Carrots	5
Swedes	7
Barley meal	3
Wash	15
	33

And for boars, and sows with young:

	Lbs.
(*c*) Potatoes	9
Barley meal	1
Cake	½
Grains	7
Bran	1
Wash	15
	33½

	Lbs.
(*d*) Potatoes	5
Cooked maize	2
Pollard	2
Carrots	5
Wash	14
	28

A suitable ration for sows suckling their young is composed of buttermilk, or skim milk and middlings, with barley meal or maize meal. The following rations may also be recommended:

4 lbs. sharps	or 4 lbs. sharps.
3 lbs. middlings	2 lbs. bran.
2 lbs. bran	4 lbs. rice meal.
½ lb. fish meal	

Milk given to sows feeding their litters is best boiled to avoid tubercle bacilli (see Tuberculosis). Flowers of sulphur is often given to mother animals by Americans; an occasional dose of a couple of tablespoonfuls does them good, and is said to have a favourable dietetic effect. No food should be left in the troughs long after meals, else it may go sour, especially if utensils are of wood. Milk of lime may be used twice a week to brush these out (1 lb. of burnt lime to a bucketful of water), and will

keep them from getting foul (Nörner). Variety of food is always appreciated by swine, and tastiness in the diet is a thing not to be forgotten.

The individuality of the animal plays a not unimportant rôle in the matter of putting on weight. Some specimens do the fattener credit easily, others are only brought to a satisfactory state by much care and trouble. Troughs should always be kept clean, and buckets, scoops, quarters, and utensils also. Food must ever be of good quality, not mouldy, fermented, or otherwise damaged.

With right and proper feeding, what ought to be the daily increase in weight of fattening swine?

Slow-growing animals add less daily weight than quick-maturing ones, and small races than large ones. Three-quarters of a pound to 1 pound is a satisfactory daily increase in weight in races not growing quickly, whilst 1 lb. to $1\frac{1}{3}$ lbs. addition a day should be expected from fast-growing swine. An average of $1\frac{1}{4}$ lbs. increase per day in swine weighing 200 lbs. is quite sufficient.

A German observer, with a diet of 3 lbs. of bruised maize, 6 lbs. of potatoes, and $1\frac{3}{4}$ lbs. of meat meal, produced a daily increase in weight of $1\frac{1}{2}$ to $1\frac{3}{4}$ lbs. per head.

Lawes and Gilbert, from a number of fattening experiments, came to the conclusion that 4 to 5 lbs. of dry substance, with the right proportion of albuminoids to carbohydrates (averaging 1 : 5), should produce 1 lb. increase in live weight.

A writer of an article entitled "Suggestions for Pig Feeders" (in the *Journal of the Board of Agriculture* for December, 1909) gives the following interesting facts: "The weight at birth of a large number of young pigs averaged 2·5 lbs., the heaviest pig weighing 3·6 lbs. and the lightest 1·6 lbs. By weighing the young pigs regularly

for seventeen weeks it was found that they gained in weight on the average 1·9 lbs. in the first week, 3·1 lbs. in the fifth week, 4 lbs. in the seventh, 5·4 lbs. in the tenth, 5·9 lbs. in the fourteenth, and 7·6 lbs. in the seventeenth week, when they were gaining over 1 lb. each per day."

As regards the food consumed by growing pigs, the same writer says: "The average daily gain of pigs of different sizes, together with the food consumed per pig per day, and per 100 lbs. live weight per day, and the average amount of food required to produce 100 lbs. of gain, is shown in the following table:

Weight of Pigs.	Average Weight of Pigs.	Average Food Eaten per Day.	Food Eaten per 100 Lbs., Live Weight, per Day.	Average Gain per Day.	Food per 100 Lbs. Gained.
Lbs.	Lbs.	Lbs.		Lbs.	Lbs.
15–50	38	2·23	5·95	0·76	293
50–100	78	3·35	4·32	0·83	400
100–150	128	4·79	3·75	1·10	437
150–200	174	5·91	3·43	1·24	482
200–250	226	6·57	2·91	1·33	408

It is generally held that 5 lbs. of meal are required to produce 1 lb. increase in weight. The above table shows that when under 160 lbs. in weight, 1 lb. increase is gained by the consumption of less than 5 lbs. of meal.

The albuminoid ratio in pig-feeding should be in young swine, from three to five months, as 1: 4 to 5; from five to six months, as 1 : 5, and later as 1 : 5·5; and in fat swine, as 1 : 5·4 to 6·4. A table of the constituents of some of the chief foods used in pig-keeping, and the way to calculate the albuminoid ratio therefrom in a given proportion of food, may be useful and instructive.

The proportion which the nitrogenous and non-nitrogenous material in a food bear to each other is called the albuminoid ratio. If there is one part of albuminoids to six of carbohydrates, the albuminoid ratio is 1 : 6. Oil is the most fattening substance known, and passes with little or no change into the circulation and is stored up as oil or fat in the body. It takes about $2\frac{1}{2}$ lbs. of starch or sugar to make as much fat as 1 lb. of oil; it is therefore necessary to multiply the amount of oil in a food by $2\frac{1}{2}$ before it is added to the starch or sugar in order to find out the albuminoid ratio.

Food.	Albuminoids.	Carbohydrates.	Fat
Maize	8·4	60·6	4·8
Barley	8·0	58·9	1·7
Wheat	12·0	64·3	1·2
Potatoes...	2·1	21·2	0·1
Barley meal	11·6	34·5	3·4
Rye	10·7	66·9	2·0
Butter-milk	3·0	5·0	1·2
Skim milk	3·0	5·2	0·7
Whey	0·8	4·9	0·1
Peas	20·2	54·4	1·7
Beans	23·0	43·6	1·4
Linseed cake	24·8	27·5	8·9
Lucerne	3·5	7·3	0·3
Turnips	0·80	5·70	0·20
Carrots	1·4	12·5	0·2
Grass	2·0	13·0	0·4
Grains	3·9	10·8	0·8
Parsnips	1·6	11·2	0·2

Taking for example—

	Lbs.
Turnips	8
Rye	2
Whey	13
Linseed cake	$\frac{1}{2}$

and using the above table to make the calculation, the figures would be worked out thus:

Food and Weight.	Carbohydrates + Fat.	Albuminoids.
Turnips, 8 lbs	C.-H., 5·70 × 8 = 45 60 Fat, 0·20 × 2·44 × 8 = 3·90	0 80 × 8 = 6·40
Rye, 2 lbs. ...	C.-H., 66·9 × 2 = 133 8 Fat, 2·0 × 2·44 × 2 = 8 88	10·7 × 2 = 21·4
Whey, 13 lbs.	C.-H., 4·9 × 13 = 63·7 Fat, 0·3 × 2·44 × 13 = 9·51	0·8 × 13 = 10·4
Linseed cake, ½ lb. ...	C.-H., 27·5 × ½ = 13 7 Fat, 8·9 × 2·44 × ½ = 10·85	24·8 × ½ = 12·4
	289·94	50·60

The albuminoid ratio is, therefore, as 50·60 is to 289·94, or about as 1 is to 5·7.

A writer in *The Smallholder* on Pig Feeding has the following good advice: "Although a little exercise may be beneficial, it has been proved many times that if bacon hogs are allowed to run about when being given a rich, forcing diet, they invariably cost more to fatten than do those which have been kept in confinement.

"Feeding stuffs have been very dear of late, and, therefore, careful judgment in devising a suitable ration is essential. In feeding a pig it is always well to bear in mind its weight. If we take, for example, a small pig weighing 2 score or 40 lbs., 1 lb. of middlings and ½ lb. of barley meal should suffice.

"As the pig grows, then, the amount of food must be gradually increased, so that when the pig has attained double this weight it should be receiving, say, 1½ lbs. of sharps and 1½ lbs. of barley meal.

"The young growing pig will require sharps and

middlings and a small quantity of either barley or maize meal; but if it has made its growth, or does not grow so speedily as it should, meals such as barley or maize meal and fattening foods of a starchy or sugary nature may be increased.

"As a matter of fact, porkers may be fed entirely on barley meal towards the latter stage of the fattening, as also can bacon hogs, with the exception that, should the meal prove overheating, a little flowers of sulphur or Epsom salts may be given by way of cooling the system and preventing constipation.

"If we now take a pig weighing double the 80 lbs.—that is, 160 lbs. or 8 score lbs., it may receive as much as 2 lbs. of sharps, 2 lbs. of barley meal, and 1 lb. of maize meal per day.

"Now, it is evident that between these weights there must be a very gradual increase in the food given, and it is important to remember that no two pigs are exactly alike as regards their requirements, therefore the feeder must study the animal's requirements and never give more than it can comfortably clear up."

The economical feeding of a pig and the amount of profit obtained from sale of the finished product will depend on various factors.

The breed and form of the animal will, of course, govern the weight to a great extent. Warmth, too, will have its effect on the ultimate result of fattening. A good buyer of food will have the pull over a man who does not study the cost price of feeding-stuffs. Plentiful and cheap provender will not always be obtainable or prevalent at any time of the year and during every season. The limits of foods used beneficially for *fattening* are narrower than those that may be employed in general feeding.

To buy when produce is cheap, to be able to use it profitably, or hold it for a time until required, has its advantages. Exact calculations by comparison of the weight of the animal when sold with the price received will give the cost per score or pound live weight. Against the amount received must be set the cost of nutriment during suckling, weaning, and fattening; and something, too, must be put down for attendants' wages, etc. From 5s. to 6s. per head may be taken as the average expense up to weaning-time.

Good bacon pigs, at the present time, can be produced cheaply on a mixture of two-thirds of sharps and one-third of palm kernel cake meal, and when the pigs get used to the meal, the sharps may be lessened and the meal increased up to two-thirds. In addition, about 4 lbs. of fish meal may be added to the ration daily. These foods are best given after being well soaked in water for twelve hours before putting down. A pig about sixteen weeks old, if given 3 to 3½ lbs. of meal daily, with a run of grass, can put on 1 lb. of increased live weight each day. It does not pay to give more than this quantity of meal daily. If sty-fed entirely, from 4 to 5 lbs. of meal daily is sufficient.

Four lbs. of meal at £18 a ton is cheaper to use than 5 lbs. of meal at £16. So a point like this needs watching.

Under the control of the Guelph Agricultural College, in America, some interesting experiments were made by farmers to ascertain the cost of producing 1 lb. of bacon. Six shillings and threepence was taken as the cost of the pig when weaned.

The table on p. 82 explains what it cost to make a

Comparative Cost of Pig Foods.

Lot	No. of Pigs.	How Bred.	Cost at Weaning-Time.	Age when Sold (Days).	Weight when Sold (Lbs.).	Food Consumed.	Cost per Lb. when Meal is worth £4 3s. 4d. per Ton.	Cost per Lb. when Meal is worth £4 15s. 10d. per Ton.
No. 1	9	Yorkshire boar grade, Tamworth and Chester white sow	56s. 3d.	217	1,800	Barley, 3,552 lbs. ; shorts, 905 lbs. ; mangels, 740 lbs. ; green clover, 2,850 lbs. ; milk, 1,620 lbs.	$1\frac{3}{4}$d.	2d.
No. 2	12	Yorkshire	75s.	224	2,425	Barley, 5,374 lbs. ; shorts, 1,169 lbs. ; mangels, 815 lbs. ; green clover, 3,900 lbs. ; milk, 2,160 lbs.	$1\frac{1}{4}$d.	$2\frac{1}{5}$d.
No. 3	12	Yorkshire	75s.	247	2,360	Meal (barley, shorts, peas, oats), 7,333 lbs. ; mangels, 545 lbs. ; milk, 2,520 lbs.	2d.	$2\frac{1}{4}$d.
No. 4	10	Yorkshire	62s. 6d.	238	2,050	Meal (barley, peas, and oats), 5,171 lbs. ; shorts, 1,038 lbs. ; mangels, 3,200 lbs. ; milk, 2,050 lbs.	2d.	$2\frac{1}{4}$d.
No. 5	7	Berkshire boar, Yorkshire sow	43s. 9d.	233	1,535	Barley, 1,950 lbs. ; wheat, 1,300 lbs. ; oats, 800 lbs. ; mangels, 6,000 lbs. ; milk, 8,800 lbs.	$2\frac{1}{2}$d.	3d.
No. 6	14	Berkshire boar grade, Yorkshire sow	87s. 6d.	179	2,740	Meal (barley and peas), 10,016 lbs. ; mangels, 3,300 lbs. ; milk, 4,020 lbs.	$2\frac{1}{4}$d.	$2\frac{3}{4}$d.
No. 7	8	Tamworth boar grade, Yorkshire and Tamworth sow	50s.	200	1,740	Barley, 3,115 lbs. ; shorts, 390 lbs. ; mangels, 600 lbs. ; milk, 1,200 lbs. ; 51 days on stubble without other food	$1\frac{3}{4}$d.	$1\frac{5}{8}$d.

pound of bacon, having regard to the price of meal. The basis of the value of food was as follows:

	s.	d.	
Skim milk and buttermilk	0	7½	per cwt.
Roots	8	2	per ton
Grass foods	8	2	,,
Whey	0	2	per cwt.

Meals and bran, £4 2s. to £4 14s. per ton.

There was a predominance of Yorkshire blood in the pigs used. No account was taken of the quality of pork or bacon produced. A barley and pea-meal-fed pig would make more than a maize-fed one. The money values have been converted into English ones from those given in dollars and cents.

X

PASTURAGE

The advantages of pasture for swine are manifold; perhaps they are not altogether appreciated and noted at their proper value in this country. Grazing represents the method of feeding pigs as designed by Nature, whilst sty-feeding, settled and varied by civilization, is an artificial plan. The advantage of pasturing lies chiefly in the favourable influence which the sojourn and movement at will in the open air exercise on the health and general condition of the animal and then on the easy and most economical way of feeding the pig, as well as on the possibility of an advantageous and profitable consumption of sparse or far distant pasturage the use of which is not possible or is unprofitable in other ways. The chief drawbacks to pasturing lie in the difficulty of the right estimation of what the grazing result will be and in the dependence on climate and weather, but these disadvantages are counterbalanced by great advantages, and where circumstances and opportunity permit these should never be overlooked. With goodwill and the necessary experience which every pig-keeper must acquire for himself a satisfactory outcome from pasturing will be reached. Effort or discernment in obtaining grazing-ground close to sties does not always play an important part in pig management. Even rubbishy land stocked with weeds will be better than nothing, and greatly improved by swine grazing thereon; the rank vegetation will be kept down, and the field manured with good material. Wherever

the porcine race can run out to pasture in the middle growing and reproductive periods, they will benefit in many ways. If good red clover or lucerne half a foot high be present, and the pigs allowed to feed on it for an hour three or four times a day, little trouble will be given in fattening, and six weeks in the sty will make them satisfactory animals for the butcher. Wet pasture, old fibrous nutriment, and bad weather, all need guarding against.

The free movement in the open and the fresh air reinvigorate the animal system. The breathing organs get expanded; the skin becomes active; the blood circulates more quickly; digestion benefits; waste products are better got rid of; and nitrogenous change, on which all tissue formation depends, proceeds more actively. Growth and constitution thrive on exercise, and lean and fat in the body of the animal improve in quality. Bone also benefits by movement and fresh air; the limbs fill out straight, strong, and rounded, and running out helps to keep away rickets from the growing pig. The artificial life—for ever in the sty—is not what Nature intended in the tribe, and prolificacy and capacity for bearing young both benefit by pasturing. Exercise in itself, though the field be poor and what falls on it scant, though delectable, will have its good side. In summer, grasses, weeds, and plants avoided by other animals will be eaten with relish by swine, and worms, insects and their larvæ, mice in their haunts, will all be tracked and devoured by pigs. Fallen fruit, acorns, beech-nuts, fungi, lower forms of animal life, will be eaten if they can be obtained, and even carcasses when fresh do not come amiss. A run under the trees in an orchard is greatly appreciated at certain times of the year; beech and oak woods are delightedly traversed. The consumption or destruction

of valuable feeding stuffs on the way to or from pasturing may be avoided by the erection of simple and cheap shelters on the pasturage itself.

The pig not only roots up and turns over the upper soil in loose places, but goes sedulously through the subsoil and takes up from thence worms, larvæ, pupæ, fungi, and tasty roots. It eats a certain amount of earth directly and draws part of its anorganic nourishment from it. The more or less earthy matter obtained this way is missed in sty-feeding and in the winter, and access may be given to it by cutting sods and putting them in the sty and thus improving the pig's health. If the climate and time of the year are suitable, swine may be left in the fields and woods overnight, but if used to other conditions and feeding they may forsake them at first. In such cases they may be brought overnight into simple enclosures or primitively roofed structures. If the sties adjoin the pasture they may be brought in at night. If left out overnight they must be prevented from getting out of bounds, and the danger of one or two animals getting lost be guarded against. They may be wired in by means of good pig-wire. Every piece of land used for grazing swine should have a suitable drinking-water supply; where this is not present naturally an artificial supply must be provided, as the animals do not do well otherwise. During warm periods of the year swine like to bathe in water and wallow in the mud at the edges of streams; but they should not come to these places overheated, otherwise cases of sudden death may arise. Swine should not be driven too quickly on to the grazing ground nor on the way to and from the pasture so that they become overheated, because congestion of the lungs and exhaustion may ensue. In large herds it

is advisable that distinct families and different-aged animals should graze apart from one another, and in driving out the light-footed, younger animals must be restrained so that they do not go too fast for the older ones. In every case the older animals and the pregnant sows should not be hurried on to catch up the younger, because mishaps may arise this way. Sows far advanced in pregnancy should graze near at hand. In hot periods of the year shady places are desirable in the fields, so that the pigs may get shelter from the hot rays of the sun; if close at hand they may be brought in during the hottest part of the day. A good grazing ground must provide sufficient nourishment for the swine, for where there is nothing pigs can find nothing; on clean drift-sand and in cheerless pine-woods they, like other animals, will be reduced to a hungry state, but, as omnivorous animals, they will find a little more nutriment even there than the sheep and cow. There are certain difficulties which prevent as positive and near an estimation of the exact feeding value of a pasturage as compared with feeding in the stye. On this account grazing has been discredited somewhat unjustly, for the experienced grazer will soon notice by the condition of his animals when put out whether the herbage furnishes sufficient nourishment or not.

Very young and very old animals require cautious pasturing, and may be kept out altogether; boars, of course, ought to be confined. In-pig sows may have daily runs out until the day before pigging, and benefit considerably thereby; but after parturition, during suckling, they must be judiciously admitted to pasture, because by too much exertion and vegetable nourishment the supply and quality of their milk may go seriously

wrong. The litter should have suckled before the sow is driven out. When the family is taken away from the dam, it is best that she be kept in until she comes on heat again, as, if turned out, she only comes back to look for her family, and feeds badly; whilst, if out with other females, and coming on œstrum at pasture, she will be riding and upsetting them.

If the grazing stuff be not over-nutritious, a little supplementary feeding, such as skim milk, steamed potatoes, and kitchen refuse, will help the herd along until the time comes to put them up for the last weeks of the fattening period.

When grazing, quiet, gentle movement about almost at will, so that the pasture is equally used up, produces good results, for it must not be forgotten that in most cases where the feed is nutritious, fattening and growth are proceeding together; haste, hurry, and chasing the pigs about are all against flesh production and good digestive work. Spring, summer, and early autumn, when the weather is good, are the periods for roaming the fields and stubbles; and where swine can do this, a healthy, strong, prolific race, good in form and constitution, according to the breed, will be the result.

Where facilities do not exist for grazing, green food, such as rye-grass, Timothy, lucerne, and clover, and, in some countries, rape, may be brought to the animals in their sties. The provender given must be young and succulent, not old, dry, and fibrous.

Mr. S. F. Edge, of Gallops Homestead, Ditchling, Sussex, has for many years been a stout upholder of the advantages of grazing for pigs. In an article in the *British Pig Breeder*, entitled, "Are your Pigs Good Grazers?" he writes as follows:

"This is a question all pig-keepers should ask themselves and then take steps to see that it can be answered in the affirmative.

"A really good grazing pig will find at least half its living if turned out, no matter how rough or poor the ground—in fact, there are many weeds not at all liked by sheep that the pigs like and search for. So that not only are they partly getting their own living, but they are helping the farmer to get rid of plants he does not wish to have.

"I happen to have two breeds of pigs—one, the Large Black, noted for all time and generally held up as the ideal grazing pig. The other is the Middle White, which does not bear a good reputation for grazing. My experiments have shown me that having the Middle Whites farrowed out of doors, the little ones begin to feed about at an early age, and once the grazing habit is introduced they hold to it all their lives. And I am now, by careful selection, getting Middle Whites to graze nearly as well as the Large Blacks. *Per contra* I find that Large Blacks forced from youngsters for show or other special purposes seem to lose the art of grazing.

"These experiments seem to me to show clearly the differences in the two breeds in the grazing habit, and I fancy the explanation is that as a rule the Large Black has been reared as a bacon pig, and therefore was likely to have more freedom when young, whereas the Middle White has generally been used to produce little pork pigs, which have been forced almost directly they were weaned, and kept in closer confinement.

"It is, however, interesting to find one can introduce the grazing habit into the Middle Whites, and thus give a greatly added value to some of their other good points of

roundness and rapid growth when young. I am certain it will prove of great value to farmers and others, who love the old-fashioned lean sows of slow growth, to mate them with grazing strains of Middle Whites.

"I find my pigs not only graze pasture with its grass and weeds, but eat the young leaves of almost any undergrowth, and if cut, will clear up any kind of thistle and appear to get great satisfaction from them. Curiously, they do not touch them when growing, only when cut off. They will follow anyone cutting them and keep picking them up as the thistles fall.

"Another thing I notice a good deal this year is that these good grazing pigs do not seem to enjoy or eat anything like so much grass or clover if cut and given to them. They much prefer to graze it themselves. Even keeping them short for a time and then bringing it to them quite fresh, they will not eat the amount or with the same keenness they do when they pick it themselves. I think the day is coming when many pig-keepers will grow crops for their pigs and fold them like sheep. I see clearly one can get strains that will do it and flourish under this system with its many advantages.

"It is simply wonderful to see some of my open-air-bred gilts with ten and eleven little pigs, doing them marvellously, and yet holding good condition themselves. It seems to me the explanation is quite clear—the apparently fat condition they are in before farrowing is not fat, but real good flesh, and this, when suckling hard, does not fall off them like fat does off the sow that has got into apparently good condition, but is really looking fit through want of sufficient exercise, and therefore has no reserve of constitution when it comes to bringing up a lusty and hearty family. The more I go about and see

other people's pigs the more I realize how difficult it must be to make pig breeding and feeding pay unless the breeding animals have plenty of liberty and are not bred from until at least twelve months old. These immature and insufficiently exercised pigs have small farrows and bring them up badly; their young ones grow slowly, and frequently suffer from rickets and kindred troubles, all of which seem to disappear with the open-air-bred pigs fed on sound food, with plenty of green meat."

Mr. James Long estimates that 15 lbs. of green food, such as Timothy and clover, will fatten a pig ½ lb. daily, and that an acre of these two grasses used by five hogs from May to October produces a return in pork of 382½ lbs.

M. Paul Diffloth, in his book, "Zootechnie Spéciale," considers that grazing on suitable pasture answers for three fattening operations—viz., those undertaken to produce precocious, normal, and up-to-the-age-of-one-year fat subjects.

The first named, beginning when the animal is three or four months old, is followed until the clover is scarce; then green food is replaced by sty-feeding, and the latter should be pushed energetically. In good clover years four to six weeks in the sty suffice to furnish an excellent carcass.

In normal fattening sucking-pigs born in April are fattened until mid-June, after which they are put to pasture; a supplemental food is necessary, such as ½ lb. of wheat bran, ½ lb. of barley, and ½ lb. of maize. Towards the end of October and through November the complementary food is visibly increased, and the animals then receive 1 lb. of bran, 1 lb. of oats, 1 lb. of rye, and 2 lbs. of barley. At the age of seven months, pigs treated thus have brought in, through pasturage, an estimated

profit of about 52 francs (£2 3s. 4d.) a head, their weight easily reaching 230 lbs.

The third type of fattening cited by Hösch was conducted on pigs receiving such food as above mentioned for a year which were then sent out to pasture; in addition, they received annually 80 lbs. of wheat bran per head, the year not being a favourable one for clover. Fattening in the sty followed for fifteen days. During this period the animals consumed 275 lbs. of barley, 275 lbs. of rye, 275 lbs. of potatoes, and 55 lbs. of wheat bran per head, and arrived at a very satisfactory fat condition.

Dr. Nörner, in his book "Praktische Schweinezucht," gives the result of some experiments in swine-feeding on red clover, undertaken by Hösch, of Neukirchen, which shows the economy that may be effected by pasturing. One hundred and twenty swine (sixty fairly old sows, thirty younger ones, and thirty very young, from the age of six to ten months) were pastured on a clover-field of 20 acres for 120 days.

If these animals had been fed in sties, they would have consumed per head, as regards the old ones, 2·15 lbs. of maize or barley meal and $\frac{1}{2}$ lb. of crushed beans, at a cost altogether of 19 pfennigs, or about 11s. 6d. daily for sixty head.

The younger sows, consuming the same food as the older ones, but, in addition, 1 lb. of wheat bran at 5 pfennigs, would cost 24 pfennigs each per day to keep; or, for thirty head, a cost of about 7s. 2d. daily.

The very young sows a like food as the younger ones, and besides 1 lb. of crushed oats at 7 pfennig per head, the cost for thirty head being about 9s. 3d. daily.

For the 120 sows the daily expense of feeding in sties would have come out at about 27s. 11d., or, in 120 days,

about £168. If one reckons 70s. for pasture on an acre of clover, then, for 20 acres, £70 is the cost. Through pasturage, therefore, a saving of £98 has been effected. These figures are pre-war ones. At the present time the economy effected by grazing will be far greater.

Open-Air Shelters for Pigs are made by driving four stout posts into the ground, and putting hurdles or wire netting inside and outside the posts, and stuffing the intervening space with straw, gorse or bracken. Straw-packed double hurdles may form the roof, or the roof may consist of faggots thatched with straw. Semicircular corrugated iron may also be used for shutters. It is necessary that the open side of the shelter does not face the prevailing wind. Dry bedding, such as straw, dried bracken, or leaves, should be supplied.

Combined Sty and Pasture Feeding.—If the pasture does not offer ample nourishment the rational pig-keeper will supplement the lack by sty-feeding, and this is best done early so that the swine do not come to graze too hungry and do not greedily devour everything they may find, but are somewhat particular and instinctively discriminate between what suits them and what does not. With small grazing grounds, and in cases where the run out is more in the nature of exercise, and for sanitary reasons, evening grazing will suffice. This combined feeding can be conducted in such a way that the proportions are right. Kitchen refuse is very suitable, as it is cheap and otherwise of no value in the household. Combined sty and pasture feeding are not only suitable for small pig-keepers, but those with a number of pigs can carry on in the same way since ranges, commons, arable land, and woodland pasture may be available.

The advantages of pasturing only and combined pasturing and sty-feeding are as follows: Grazing is always

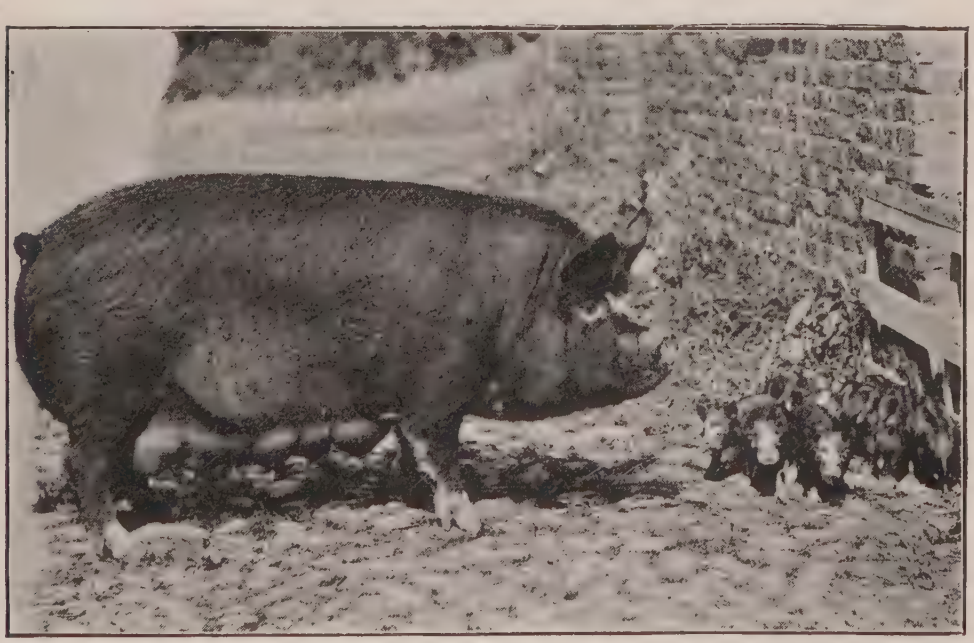
cheaper than sty-feeding, firstly, on account of the low price of the pasture, and then the small cost of attendance and care of the animals. Many regions may serve usefully for swine—for instance, swampy places, which can only be grazed by other animals with considerable risk to their health. Half-grass fields can be allocated to swine where the feeding conditions are otherwise more or less valueless.

Of special importance is the enormous advantage which grazing gives to the pigs from a sanitary point of view. Suitable movement in the open air not only strengthens the constitution of the animal and benefits its general condition and the assimilation of the food taken up, but it strengthens also the ability to resist unfavourable external influences and is of value in warding off illnesses which are all too common in sty confinement and feeding.

A drawback to pasturing is the difficulty in estimating the food value of the pasture, so that the inexperienced and unobservant easily overlook the lack of proper development of their animals. This defect is more than counterbalanced by the economy effected in grazing, and by supplemental feeding in the sty can be suitably remedied. The dung of the pigs at pasture is very valuable to the land. For breeding swine especially is grazing beneficial, and even if the only available piece of ground is a stubble field or an unbroken plot of arable land it should be made use of. The movement in the fields and woods exercises a very favourable influence on growth and health and on the respiratory organs. The breathing is improved; the oxygen taken up stimulates and regulates the circulation of the blood to the organs and to all parts of the body and improves appetite and

Photo, G. H. Parsons.

FIG. 15.—BERKSHIRE BOAR: OKEFORD EMPEROR.
Owned by Mr. R. W. Hudson, Danesfield, Marlow. First and Champion, Royal Show.



Photo, G. H. Parsons.

FIG. 16.—A PRIZE BERKSHIRE SOW AND LITTER.
Owned by Mr. S. Sanday, Puddington Hall, Neston, Cheshire.

Plate IX.

Photo, G. H. Parsons.

FIG. 17.—PIGS AT PASTURE.

Photo, G. H. Parsons.

FIG. 18.—PRIZE LINCOLNSHIRE CURLY-COATED GILTS.
Owned by Mr. H. Dudding, Riby, Grimsby.

digestion in no uncertain way. The muscular system is especially benefited and growth and form improved. By grubbing in the earth swine obtain needed mineral matter, and from a natural point of view something can be said in this connection against putting rings in their snouts. Briefly, pasturing wards off sterility, liability to common illnesses, especially tuberculosis, infectious abortion, and lack of vitality in the litter.

XI

SPECIAL NOTES ON FOODS

Potatoes.—One of the most valuable and acceptable foods for swine, especially where dairy waste can also be obtained. Cooked or steamed, they have been shown by many experiments to produce much better effects than when given in the raw state, which latter may be injurious to pigs, causing diarrhœa and indigestion. When steamed and crushed, they pass quickly from the stomach to the intestines. Where they are the principal nourishment given, swine should receive them as often as they are hungry, which will be more frequently than where they are appropriately blended with some cereal food. Containing about 75 per cent. of water, the tubers are rich in starch but poor in albumen. When sprouting they become somewhat innutritious, and may be injurious if not used cautiously; the germinating produces a poisonous alkaloid called solanin.

As a food for very young pigs, they are poor in lime salts, necessitating the giving of some farinaceous meal along with them. Pea meal and potatoes go well together. When the latter are frosted, they may cause harm, but soaking in water for an hour before being steamed or cooked draws out the frost (May). Fermented potatoes are used in some parts of Germany as a foodstuff. Towards the end of May the tubers are cooked or steamed, put into walled-in pits and rammed down, or into cavities dug out in the ground and lined with

boards. The potatoes are placed in the hole with layers of chaff between them, and covered with straw, leaves, and earth, so that all air is excluded; lactic fermentation then takes place in the mass, and a tasty nutriment is produced. This food is never given alone, but is mixed in right proportions with crushed corn, buttermilk, etc.

Potatoes may be preserved by drying, and foulness and fermentation avoided. In plentiful potato years the tubers may be flaked, chipped, dried, and used in times of scarcity. According to Soxhlet, $2\frac{1}{5}$ lbs. of dried flaked potatoes have the same food value as nearly 7 lbs. of the fresh specimens. Soaking the flakes in warm water makes them usable (Nörner).

Pressed or dried potatoes, also called papka, are prepared by putting the tubers through a wringing and pressing apparatus which squeezes out the water, and then drying them by means of evaporation. Their digestibility (organic substance, 94·5 per cent.; albumen-free extractive matter, 98 per cent.) is no lower than that of flaked potatoes. Pressing makes them a little poorer in proteids. From recent experiments at Bonn by Kellner, eight swine fed with potato flakes gained about 541 lbs. in eight weeks, whilst eight others fed with pressed potatoes gained about 635 lbs. The pressed tubers were so well eaten up that only skim milk was necessary along with them as a satisfactory fattening diet. At the Kaiser Wilhelm Institute at Bromberg, four swine fed with flakes gained about 888 lbs. in six weeks, and the same number with pressed potatoes put on 937 lbs. Similar results were noted at Rostock and Münster.

Maize contains the greatest quantity of fat, a large amount of starch, and least albumen of any grain given

to pigs. As a food for young growing swine it is not desirable. The over and prolonged use of it causes soft carcass fat, especially in the winter period as opposed to summer-time (Danish experiment). It may be used advantageously and without harm if it constitutes about half the ration given, and is not continued right up to the end of the fattening period; bran, shorts, or pea meal are desirable accompaniments. Crushed or as meal is the form in which it is fed. Whole maize is uneconomical and undesirable. Four pounds of maize meal has been shown to produce 1 lb. addition in live weight (Long: Professor Miles's experiment, Michigan Agricultural College). Stiffness may arise in young swine from overfeeding on maize. Green maize is rich in sugar and water; when cut and mixed with other food plentiful in albumen, it forms a valuable food for swine.

Barley.—The best food for pigs is barley and milk. It produces the most excellent and highest-priced flesh, white, firm fat, and fine-grained lean. It is, however, a rather expensive food, rich in albumen, and should be mixed with other nutriment. It answers for pigs of all ages when given soaked or crushed and mixed with warm water. A little whole barley may be advantageously sprinkled about for piglings or stores. In this country barley meal takes first place as a pig food, and according to experiment, when properly used, will produce in good fatteners about one-sixth of the total weight given in carcass increase. Barley meal, fed in combination with pea meal and middlings, gives very good results.

Wheat is a high-priced food for pigs, but is much liked by them, and not a few good breeders make use of it as wheat meal or when crushed and soaked. The grain is eagerly picked up by youngsters at weaning-time if

sprinkled about in small quantity. It is, perhaps, the most nutritious of all foods, very rich in albumen, and so quite suitable and advantageous when mixed with other food at the last stage of fattening.

Beans are heating as a food, but may be given in the form of meal in a mixed diet. If soaked, steamed, or cooked whole, they are eaten with relish, but if largely used, they should be crushed and mixed with about a fourth part of crushed barley or wheat bran. Too great quantities of them may produce constipation, plethora, or inflammation of the stomach and intestines (May).

Peas are largely used in the last fattening stage, and as meal along with potatoes, supply the necessary albumen to the diet. If given too largely they upset digestion, but when judiciously used help to make excellent carcasses. Peas are superior to maize as muscle-formers.

Oats, about the same composition as barley. Best given crushed or ground. Useful for milch sows to improve milk-supply. Employed at the finish of the fattening period, they produce good flesh and firm fat.

Earthnut, cocoanut, and palm-nut meals have been largely used in pig-feeding lately. The cakes also have been fed to pigs along with sharps and fish meal and maize gluten. The meals give the best returns if soaked for twelve hours or more before giving to the pigs. Finely ground palm-kernel cake is about equal in value to fine sharps (thirds) and better than extracted palm-kernel meal. It is useful to remember that 8 lbs. of earthnut cake, 9 lbs. of linseed cake, and 10 lbs. of palm-nut cake are respectively equal in food value to 10 lbs. of barley.

Mangels, turnips, carrots, and parsnips may all be profitably used to vary diet. They are easily digested

when pulped or sliced small, mixed with meal, and given in the early stage of fattening. The use of roots in early days widens the digestive canal. When given in large quantities, they are usually cooked or steamed and mixed with an albumen-rich food. Barley and middlings and maize and middlings are improved by the addition of pulped mangels.* Chemically these roots are rich in starch and sugar, but not so in albumen. Rice meal goes well with turnips. Mr. W. A. Henry, in an article on " Feeds and Feeding," estimates that 8 lbs. of mangels give the same increase in weight as 1 lb. of grain.

Linseed Cake.—Useful to help the milk-supply in the breeding sow and as a fattener. About 4 ounces a day may be given to sows before and after farrowing. Rich in oil and albumen. Linseed meal (ground cake) mixed with hot water, made into a thin broth with a little bran and cooked potatoes, is eaten with relish by mother-swine and fatteners. Linseed cake and maize is a good combination for fattening purposes.

Brewers' Grains.—Not very digestible food for pigs, but somewhat largely used in certain districts for suckling sows and active stores when mixed with other food. They contain about 75 per cent. of water as wet grains when coming direct from the brewery. The less malt abstracted from grain by the brewer, the more nutritious the residue is. As regards their composition, they consist chiefly of husks of grain, a little starch, glucose, and gluten, and some yeast cells; also some hard grains dried too quickly that have escaped the action of water (R. Gouin). They should be given warm in cold weather,

* " Suggestions for Pig-Feeding," the *Journal of the Board of Agriculture*, December, 1909.

and at any time need much animal heat to bring them up to body temperature.

Skim Milk.—A very valuable and palatable auxiliary food for pigs, putting on fat and flesh of the best kind. It contains about 4 per cent. of albuminoids. The longer one can keep piglings and growing stores on sweet skim milk, the better they will furnish out in flesh and limb. When mixed with barley it forms about the best possible food for pigs, making fine flesh of excellent taste. Any kind of milk will not suit swine. Sour milk is not so good as sweet, but it sometimes makes food tasty, and may be mixed with potatoes and turnips.

It has been, and still is, the custom to recommend that milk unfit for human consumption should in many cases be given to the pigs. Tuberculosis, or consumption, is a disease communicable from cows to swine, and where a diseased udder exists, or there is reason to suspect that a cow is tuberculous, the fluid should be boiled or kept at a temperature of 176° F. for ten minutes; any disease of the vessel in the cow should necessitate boiling milk before feeding the pigs.

In 1907 and 1908 experiments were conducted at Clonakilty Agricultural Station, Ireland, to test the value of skim milk for pig-feeding, and to discover the price that pork must realize to make separated milk worth one penny per gallon for pigs.

The food supplied to three lots of pigs, thirteen in each batch, was as follows:

Lot 1.

1 part by weight of meal.
4 parts by weight of potatoes.
6 „ „ separated milk.

Lot 2.

2 parts by weight of meal.
6 ,, ,, separated milk.

Lot 3.

2 parts by weight of meal.
4 ,, ,, potatoes.

The meal consisted of a mixture of about equal parts of maize and barley, with a small quantity of pollard. It was assumed, from the Danish basis, that 4 lbs. of potatoes or 6 lbs. of separated milk are equal to 1 lb. of meal.

From these experiments it was concluded—

(*a*) That milk is absolutely necessary for the economic production of pork.

(*b*) Separated milk fed to pigs along with meal and potatoes gave a return of about 2d. per gallon when pork was sold at 48s. 3d. per cwt. An increase of 7s. per cwt. in the price of pork was equal to an extra penny per gallon for the milk.

(*c*) To return 1d. per gallon for the separated milk pork must not fall below 40s. 4d. per cwt.

Buttermilk and Whey.—Buttermilk, being very rich in fat, is useful in fattening operations. It is said that it has an advantage over separated milk as a food for pigs, being slightly richer in albuminoids and fat, but for all practical purposes they may be taken as about equal in feeding value.

Whey makes an excellent food when mixed with meal. Barley meal and oat meal go well with it, as also pulped and steamed roots and bean meal in winter (Long).

Experiments conducted at the Ontario Agricultural College, to compare the value of various dairy by-products as foods for pigs, led to the following conclusions:

Skim milk gave the largest gain per pig, as well as the

most economical gain. Buttermilk came so close to skim milk in feeding value that it may be regarded as practically equal to skim milk as far as this experiment goes. Ordinary whey shows a distinct advantage over separated whey in this test. If we represent the feeding value of separated whey by 100, the feeding value of ordinary whey would be approximately 125, buttermilk 160, and skim milk 163·5. That is to say, ordinary whey showed a feeding value 25 per cent. higher than that of separated whey, buttermilk 60 per cent., and skim milk 63½ per cent. higher. A small proportion of whey to meal was fed, and under such conditions the dairy residue will always show a much higher feeding value per 100 lbs. than when fed in large quantities. The same is true of skim milk and buttermilk. If fed in small proportions they closely approximate each other in feeding value, as ordinarily fed whey seldom shows a value higher than one-half that of skim milk or buttermilk.

Bran and pollard, middlings or sharps, thirds or fourths, are all given to sows in gestation and after parturition. They are used in a sloppy state. There are two varieties of bran—a coarse and a fine. The fine sort is termed "pollard." The nutrient value of bran is very variable, depending on the quantity of flour adherent to the husks. A rough test for its flour contents is to put the hand into the moist mass and observe its whiteness when one withdraws it. The greater the whiteness, the more the flour. It absorbs about two and a half times its weight of water (R. Gouin). Thirds and fourths are coarse mill offals, greyish in colour, and containing a fair amount of gluten. Mixed with skim milk and a little meal, these products are often given in a sloppy state to sows and their litters.

In pig-feeding a combination of maize and middlings

gives 20 per cent. better results than middlings alone. For young pigs two parts by weight of middlings to one of maize is recommended.*

The following interesting table gives the approximate value for pig-feeding of the average crops produced on one acre of Great Britain. It appeared in an article (name of the author not given) on "Pig-Feeding" in the *Journal of the Board of Agriculture* for January, 1910.

Coburn, in his "Swine Husbandry," takes as a comparative basis 4 lbs. of grain or 15 lbs. of green clover or lucerne as producing 1 lb. of pork.

The writer adds that when fed with a suitable quantity of grain, root and fodder crops form a useful portion of the ration, and may be expected to produce pork at the approximate rate mentioned in the third column.

	Crop.	Gross Produce per Acre.	No. of Lbs. per Lb. of Pork.	Pork per Acre.	Value of Pork at 6d. per Lb.	Percentage Composition. Wheat = 100.
					£ s. d.	
A.	Wheat ...	31 bushels of 60 lbs.	4·5	413	10 6 6	100
	Barley ...	33 ,, 55 ,,	4·5	403	10 1 6	97·5
	Oats ...	39 ,, 40 ,,	4·5	346·5	8 13 3	83·9
	Beans ...	30 ,, 64 ,,	4·5	426·5	10 13 3	103·2
	Peas ...	27 ,, 64 ,,	4·5	384	9 12 0	92·9
						Potatoes = 100.
B.	Potatoes ...	6 tons	20	672	16 16 0	100
	Mangels ...	19 ,,	36	1,182	29 11 0	175·8
	Turnips ...	13 ,,	36	808	20 4 0	120·2
	Carrots ...	15 ,,	36	933	23 6 6	138·8
	Lucerne ...	10 green	15	1,493	37 6 7	222·7
	Clover ...	8	15	1,194	29 17 2	177·2
	Rape ...	10	15	1,493	37 6 7	222·2
C.	Skim milk		20·30			
	Buttermilk		20·30			
	Whey ...		50			

* "Suggestions for Pig-Feeding," the *Journal of the Board of Agriculture*, December, 1909.

XII

THE LABOURER'S AND ARTISAN'S PIG

The man with little money to spare, who wishes to put it out profitably in making food for his household, in fattening a pig or two for the butcher, or in purchasing a sow and breeding a litter, should embark on the venture with all-round consideration of his opportunities. He must have accommodation for the animal—present, provided, or cheaply made. Perhaps the least expensive substantial sty, where one has to be newly erected, is that constructed of galvanized iron, with a brick floor. In many places, however, sties or hovels have existed for generations, and been remarkably well or indifferently tenanted. A number of them are rough and tumble-down structures sadly in need of some intelligent repair; therefore a little labour and money expended in renewing tiles, thatch, woodwork, floors, troughs, sweetening the inside of the place, and, perhaps, by a lining of felt or woodwork, adding to its warmth, will all repay time and trouble.

Mr. E. Paine, writing in the *Smallholder*, gives the accompanying illustration and description of a cheap sty:

"This is how my first sty, then, was built. First a dry piece of ground was selected, and the loose earth to a depth of 9 inches wheeled away. This space was 10 feet by 5 feet. From an old gravel-pit near by some of the discarded top core was wheeled in, the bigger pieces being put at the bottom and well rammed. All the old broken

bricks and pots lying round also found their way into this foundation.

"Then some finer stuff was put on, and a bag of cement was finally mixed up and the top thinly concreted, an almost imperceptible slope from back to front being given.

"Up to this point the expense had been, cement 4s.

"The sleeping-place was made of a sugar hogshead, turned

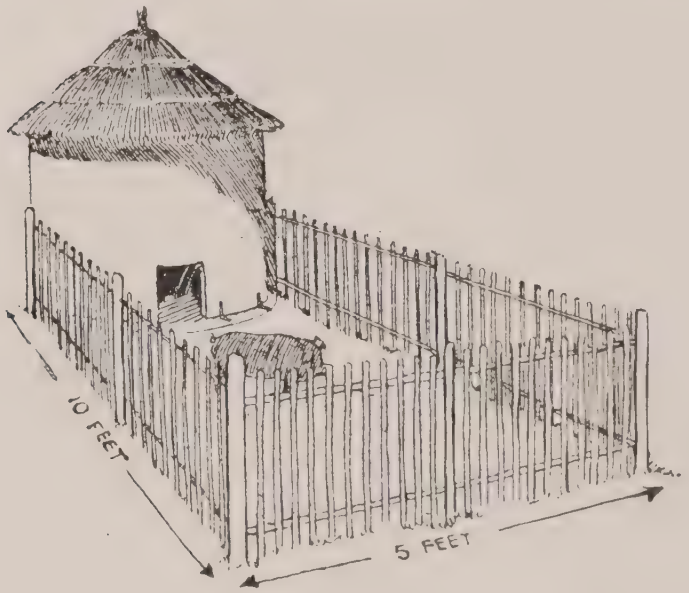


Fig. 19.

This pigsty could be run up for 12s., all told.

on end, with a square entrance cut. Half-inch holes for ventilation were bored 3 inches from the top. One head was removed and the upturned barrel was placed on a framework, thickly slatted, which rested on the concrete. This allowed any liquid to drain away, and was warmer than the concrete alone.

"The cost of the slatting stuff was 3s.

"The tub was fastened down by means of right-angled

hoop-iron strips. These were made from old barrel hoops, cost nil.

"The top was then covered with hedge cuttings and grass cut from ditches and dried, and thatched with two bundles of wheat straw which cost 1s.

The Pound.—The sides of the yard or pound were composed of five stout hurdles made of split and shaved fence poles. The poles in the rough state cost 2s., and 6d. was paid for creosoting the hurdles.

"From the butts of the poles stout posts were cut for the ends and the centres, the pointed feet of the hurdles were driven 15 inches into the ground, and the whole secured.

"My practice at that time was to buy a pig in April or May and kill it for home consumption in November; therefore, no pigs occupied the sty during the very coldest weather, but they all seemed to thrive splendidly during the summer.

"A catch-pit for the drainage was made near to the lowest part of the floor. This was covered with a board framework made from the head of the tub. The cost of this sty was therefore:

	s.	d.
Cement	4	0
Hogshead	3	0
Straw for thatching	1	0
Fence poles	2	0
Creosoting		6
Rings for hurdles, nails, screws, etc. ..	1	6
Total	12	0

"At present the cost of the sty would be somewhat more."

The handy man, with suitable material near by, with a planning head and a skilful hand, will not be checked

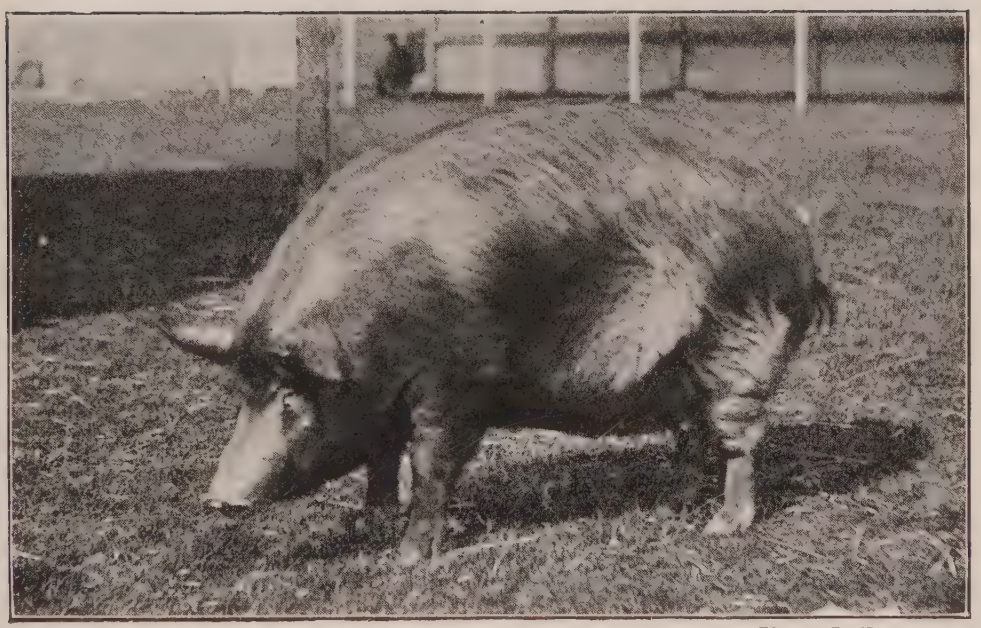
in his proposed venture by the absence of a sty, but will set to work to put up a cheap and satisfactory one, noting what the district by-laws say about its right distance from his own and his neighbours' dwellings (100 feet has been allowed in some instances).

A decent house present for the pig, then comes the question of the best tenant. The labourer, with a generous master who is a pig-breeder, may often acquire his animal cheaply; and if he has attended to his employer's pigs—as frequently happens—he will know their possibilities, and be in a favourable position to bring out what is best in one or two of them. The artisan commencing pig-breeding will probably have had many a chat with a more opulent brother, practically skilled in breeding, deeply read in pig-lore, and able to talk "pig" from morning to night.

To both venturers it is very important that a robust-constitutioned animal and a good doer be acquired if possible, because if fatting is not quickly performed, or, by reason of weakness, disease or the old complaint called "death" steps in, nothing but disappointment and loss will result. Every endeavour should be made when buying an animal to get a vigorous, strong specimen, and not a stunted, badly developed one. Constitution is more robust in cross-bred than pure-blooded specimens, and the former frequently do not cost as much as the latter. The progeny of sows are safer and more profitable as purchases than those of a gilt. The type of pig most popular and prevalent in the neighbourhood will be the one generally acquired. Middle Whites, or White and Tamworth, or Large Yorkshire and Berkshire crosses are good.

Constitution is best judged of by long knowledge, but

Plate X.



Photo, G. H. Parsons

FIG. 20.—TAMWORTH SOW.

Owned by Mr. Ibbotson, Knowle. First, Bath and West Show.

Photo, G. H. Parsons.

FIG. 21.—LARGE BLACK BOAR.

Owned by Mr. R. R. Rothwell, Fullwood Hall Farm, Preston. Winner of many Prizes.

Photo, G. H. Parsons.

FIG. 22.—LARGE BLACK SOW.

Owned by Mr. Pedley, Congleton, Cheshire. Winner of many Prizes.

an eye for form and good points will enable one to avoid a weakling and obtain a specimen that will grow profitably on what diet can be provided.

The head should be neither too long nor short; the neck and shoulder light; the chest wide and deep, and ribs well sprung; the thighs filled out and round, showing good hams; hair plentiful, glistening, and silky; sides long and fairly deep.

A single pig, bought at ten or twelve weeks old, is often a profitable investment. Obtained at this time, and weighing about a score pounds, it can be brought along with the waste from the owner's and his neighbours' households, together with a little bought meal. If sold to the butcher at seven or eight months old, and weighing 7 or 8 score, a good profit may be made, for the cost of the keep of the animal on the lines indicated above will not have exceeded 2s. 6d. or 3s. a week.

If one or two animals are bought soon after weaning, and some pasture be present or greenstuff grown, they may be brought along economically. Lucerne, as we have seen, furnishes good early fattening provender. Even the artisan may have his back-garden or allotment, where a strip of ground may be used to grow potatoes, carrots, a few mangels, or some lucerne; but probably he will have to depend more on bought food for his charges than the peasant, and perhaps on the concentrated foods may be able to bring his purchase to a satisfactory state the quicker. Potatoes, sharps, maize meal, swill or wash, a little barley meal, buttermilk, and a limited quantity of brewers' grains, will probably be used by the town man. The cottager will have the growths from his garden, and may be able to obtain some cheap

farm produce, and the smallholder will grow what he needs on his steading.

Good-quality wash from hotels, restaurants, or large households, consisting of vegetable parings, crusts of bread, dish-water, and scraps of meat, makes excellent pig-fare if mixed with middlings or barley meal.

It is a good plan to heat the mixture, skim off the fat, and remove any small bones or hard bodies likely to stick in the pig's gullet, and feed it warm, mixed with concentrated food. Occasionally, bottle-stoppers or much salt finds it way into wash, so it should be tested and searched for these harmful things. Too much salt or brine will soon kill pigs. Some fatteners in a small way use equal parts of barley meal and sharps economically, and towards the finishing period increase the farinaceous portion of the diet. The Americans hold that increase in live weight is most cheaply attained by feeding maize only; but the carcasses of maize-fed pigs in this country are often poor in quality, and not eagerly accepted by the butcher.

"Uveco," cooked maize, has recently been advocated as a valuable and economical pig-food. Twenty-eight pounds of "Uveco" is said to be equal to 40 lbs. of Indian meal. For pigs it is prepared simply by mixing with hot or cold water. It is stated to contain only 10 per cent. of water and to be easily digested, with not much waste in the physiological process. The Uveco Cereals, Ltd., Corn Exchange, Liverpool, and Bermondsey Wall, London, S.E., supply the food, with all particulars.

The small man, instead of buying one or two youngsters to fatten, may *purchase a sow and breed a litter;* but in this case he should have an exercise place, and

preferably some grazing ground. Food from house and garden, wash, brewers' grains, a small quantity of meal, and thirds or fourths, will be the mainstays then. The sow should be a strong, healthy one, with twelve teats evenly placed and all right. Good-sized females are best for breeding. The mature sow is the most profitable for the man of slender means; but probably she will not be so easy to acquire as the young one, and the would-be purchaser will be limited to Hobson's choice.

Some experiments were undertaken at the Ohio College, in the United States, to ascertain the best age for breeding sows to bring forth youngsters profitably. The matter of the weight and growth of their litters was also studied, and this is important to the man who wants to make money on the litter and advance in the quickest way financially. With fifteen sows, bred from at eight or nine months old, an average of seven and two-thirds pigs per litter was obtained; and with fourteen sows, at twenty-four months old, an average of nine and six-tenths; whilst the aged sows gave ten and six-tenths. It will thus be seen that the two-year-olds gave 24 per cent. better results than the young gilts, and the old sows were 30 per cent. better. Looking to the size of the pigs, the produce of mature sows was most satisfactory. Thus the young sows produced pigs weighing an average of 2·39 lbs. each, and the two-year-olds 2·63 lbs. each, and the aged sows 2·61 lbs. each. In the matter of growth, at six weeks old the sows produced an average daily gain of 32 lbs., whilst the pigs from the two-year-old sows gained 40 lbs.

The pregnant sow may run out in nice weather until the week before farrowing, and may graze at will, but a supplementary ration of meal should be given her to

keep her in fair store condition Under these circumstances her keep will average about 1s. a week. Where there is no grazing ground, mangels, cabbages, swedes, or carrots, from October to May, may be given to sows. A clean, well-ventilated, roomy, warm cot is desirable at farrowing time, with chaff or short straw for a bed. A miniature rail, 12 to 15 inches up the wall of the sty, and projecting about half a foot from it, prevents the mother crushing her youngsters. Dairy surpluses, if they can be obtained cheaply, will be business-like feeding for the sow rearing her young. Sharps and middlings will, however, probably be most frequently obtained, but are not very nutritious unless mixed with a little meal and skim milk. Germ meal, bran and Molassine meal form suitable foods.

The sow, when suckling, should be fed three times a day at regular intervals. As the young pigs grow, the mother's feed should be improved, and sharps, bran-mash, oats, and a few peas given. It is well for a small man's sow to pig in March, and a second litter may come in the autumn. The mother animal may be let out in suitable weather, and the sty cleaned out while she is away. In a week or two young pigs begin to forage for themselves if they see the mother so engaged, and a few crushed oats sprinkled about will help them on. When the pigs are separated from their mother and begin to feed themselves, milk and scalded sharps suit them. Sharps, middlings, a little wheat or oats, finishing up with barley meal and peas, will make good porkets at about four months old. It is important for the small man to keep his litter going all the time, and unless he can feed his sow well and obtain suitable nourishing food for the growing youngsters, he had

better not try his luck with breeding. A good, strong, well-shaped female may be chosen from the litter to go on breeding with if the artisan or labourer has flourished in his venture. On the disposal of the litter profitably will depend much of the future success of breeding operations if profits are again to be risked in further experience. The sale of porkets will probably be the most gainful for the working man, as there is a demand for them all the year round, and their production entails the least expense in food. Porkers at about four months old, weighing 5 or 6 stone, are perhaps the most saleable size of youngster.

Pig-keeping in a small way should be encouraged, pig-clubs formed, and co-operation entered upon on business lines in the pig industry.

	1885.	1908.	Per Cent. Increase.
Population of United Kingdom	36,000,000	44,000,000	=22
Number of pigs in Great Britain ...	3,686,628	4,055,716	=11

	1885-89. Average Cwts. per Annum.	1904-08. Average Cwts. per Annum.	Per Cent. Increase.
Import of bacon and hams...	4,055,045	6,758,614	=66½
Import of bacon and hams in value ...	£8,685,668	£17,565,248	=over 100

In connection with small-ownership and pig-keeping, the figures above appeared some time ago in some

Unionist literature. Above the figures appeared the words "Our Lost Chances."

It will be observed that our pig population has not increased in proportion to the human figure. This is largely owing to the lack of small-ownership, the pig being the small farmer's main stock. With a larger number of small-owners breeding pigs, millions of pounds which went abroad to buy bacon would have been kept in this country. As an illustration, compare with the above figures what Denmark has done.

	1885.	1908.	Per Cent. Increase.
Population	2,000,000	2,700,000	37
Export of bacon and hams to Great Britain	Cwt. 80,000	Cwt. 2,000,000	2,500

NOTE.—Denmark has done this by small-ownership and co-operation. Ninety-two per cent. of the population own the land they cultivate. About two-thirds of the land is covered by holdings from 25 to 200 acres; about 17 per cent. is held in quite small holdings and allotments. In thirty years the land and credit banks have loaned £45,000,000. The first co-operative pig factory was established in 1888. Note the result:

Year.	No. of Co-operative Factories.	Pigs killed by Factories.	Value.
1889	8	131,548	£327,000
1894	15	385,731	£1,114,000
1899	25	729,171	£1,733,000
1902	27	777,232	£2,500,000

To Estimate the Live Weight of Swine from Measurements

It may be useful, where no scales are handy, to be able to make an approximate calculation of the weight of a pig. This is done as follows: Measure the circumference of the animal's chest behind the shoulders, and its length from between the ears to the root of the tail; multiply the result in inches together, and divide by 13, 12, or 11, according as the animal is lean, in good condition, or well fattened. The quotient will give the weight of the animal in pounds. Thus, length of pig 52 inches, circumference of chest 50: $52 \times 50 = 2{,}600$. It is a well-fattened pig, therefore divide by 11: $2{,}600 \div 11 = 236{\cdot}3$ lbs. weight of the pig.

The slaughter weight of *half-fat* swine under a year may be generally estimated at 70 per cent. of their living weight; if over a year, at 75 per cent.; *well-fattened* swine under a year, 77 per cent., and over a year, 82 per cent. (Nörner). This weight is the estimate after the viscera have been removed from the chest, belly, and pelvis, leaving only the kidneys and fat.

The following weights of various parts of the body of two pigs are given by May in his book "Schweinezucht."

(*a*) A pig $12\frac{1}{2}$ months old weighed, after twelve hours' fasting, 406 lbs.:

	Lbs.
The flesh, with the head and limbs, weighed ..	317
The fat weighed	$28\frac{1}{2}$
Heart and lungs, $5\frac{1}{2}$ lbs.; liver, spleen, kidneys, 7 lbs.; together	$12\frac{1}{2}$
Emptied stomach and intestines	16
The blood	$14\frac{1}{2}$
Contents of stomach, intestines, and bladder ..	$9\frac{1}{2}$
Slaughter loss through bristles and wastage ..	8
	406

(*b*) The pig weighed in the evening, after feeding, 127 lbs.; the morning when fasted and before slaughter, 116 lbs.:

	Lbs.
The flesh, with head and limbs, weighed	73
Liver, lungs, heart, windpipe, tongue, kidneys, spleen, together with emptied stomach and intestines	20
The fat weighed	4½
The blood weighed	4½
	102
Bristles, claws, eyes, serous fluid, together with stomach and intestinal contents	14
	116

Pig Clubs

The Ministry of Agriculture and Fisheries' leaflet on pig insurance gives the following particulars. These will probably be useful and instructive to the small owner of pigs:

To the small owner the loss of live-stock is not only a disaster of a very serious nature, but it is also one which is liable to occur at any moment. The prudent man will, therefore, guard himself against total loss by insurance of his live-stock, which may be effected either through a registered company or through a mutual society. *A mutual society which is built upon a foundation of good rules is perfectly safe, and it is to guard against the dangers of insolvency that these specimen rules have been formulated.*

Specimen Rules for a Pig Insurance Club.

1. **Name and Object.**—The Club shall be called the _____ Pig Insurance Club, and its object shall be to help any member who sustains loss by the death

through illness or accident of an insured pig or pigs. No pig-dealer shall be a member of the Club.

2. **Management.**—The Club shall be managed by a Committee consisting of the chairman, treasurer, and five other members, together with a secretary. The Committee, any three of whom (exclusive of the secretary) shall form a quorum, shall be elected in the first instance at an early meeting of those interested in founding the Club. Afterwards they shall be elected at the annual general meeting. The secretary shall attend all meetings and (subject to these Rules) act under the direction of the Committee, but he shall not vote as a member of the Committee. The Committee shall decide on the election of new members, shall investigate and decide all cases of difficulty or dispute, and shall act as markers and valuers, and their decisions shall be final. They shall meet at least once a quarter, and seven days' notice shall be given by the secretary of each meeting. At any meeting of the Committee or of a general meeting of members, the chairman thereof, in case of an equal balance of votes, shall have a second vote.

3. **Entrance Fee for Members.**—The entrance fee shall be one shilling.

4. **Contributions.**—A member shall pay per quarter in advance for his insured pigs one shilling for each pig, providing the value of such pig is not over £1 5s. at the time of entrance; one shilling and sixpence if over £1 5s. but not exceeding £2; two shillings and sixpence if over the value of £2 but not exceeding £3; three shillings if over the value of £3 but not exceeding £3 10s.; and three shillings and sixpence if over the value of £3 10s. Young pigs are not insurable until well from cutting. Prior to insurance the value of each pig for the purpose of fixing

the premiums shall be assessed by the Committee or by not less than two officers of the Committee, to whom the power has been delegated by the Committee. A sum of ——*, as extra premium, shall be paid for each sow at least 21 days before farrowing, the maximum value of a sow to be not more than £15; a sum of three-fourths of the special value shall be paid in the event of the death of the sow within 21 days from farrowing. A sow 21 days after farrowing shall revert to normal value.

A member shall not be entitled to any benefit during the first three months of his membership.

5. **Benefits.**—Any member suffering loss through the death of an insured pig by accident or illness shall, excepting in the cases mentioned in Rules 4 and 6, receive 15s. in the pound of the value of the pig at the time of its decease; and such value—as also the maximum value of a sow referred to in Rule 4—shall be assessed by the Committee or by not less than two officers of the Committee to whom the power has been delegated by the Committee. The benefit shall (except in the cases mentioned) commence as soon as the pigs have been passed and marked and the insurance money has been accepted.

6. **Swine Fever.**—In the event of Swine Fever breaking out, so declared by a veterinary surgeon, the same shall be dealt with by a special general meeting to be immediately convened, and such meeting shall consider (1) what measures shall be taken to control the outbreak,

* It is suggested that this sum be 5s. to 10s. It would also be well to consider whether, if sows are accepted for insurance, compensation should be payable for them during the first year of the Club's existence. It is not desirable that the Club in that period should lack funds, which might be the case if several deaths of sows occurred during the first year.

and (2) to what extent—if at all—members shall receive compensation for the death due to the outbreak of insured pigs.

7. **Conditions.**—A pig must have been in the possession of a member 14 days before it can be insured. The member must give notice to the secretary of each pig proposed for insurance. The secretary shall inform the Committee, and they shall have power to reject any pig tendered for insurance. In the case of a member purchasing an insured pig from another member, the animal may, with the consent of the Committee, be insured immediately on payment of the premium.

8. **Officer of Club not to Pass or Value his own Pigs.**—An officer of the Club shall not pass his own pigs or act as valuer in any case of claim he may have against the Club.

9. **Houses and Sties to be Lime-washed.**—Houses and sties shall be lime-washed before each lot of pigs intended for insurance is put in the buildings.

10. **Illness of Pigs.**—When any member discovers illness in any of his pigs he shall immediately inform the secretary, who shall summon the Committee to investigate the case. If such notice is not given, the member shall be liable to forfeit the benefit of insurance.

11. **To Prevent Fraud.**—Should any member offer a pig for insurance knowing it to be ill or diseased, or attempt to defraud the Club, or wilfully break any rules, he shall, in addition to the penalty referred to in Rule 10, be fined or expelled at the discretion of the Committee.

12. **Levies.**—In the event of the funds not being sufficient to meet any demand that may arise, a levy shall be made on each member, the sum per member to be determined at a special general meeting held for that purpose.

13. **Deposit of Funds.**—The funds shall be deposited in the _____ bank.

14. **General Meetings.**—A general meeting of members of the Club—at which the chairman or a member of the Committee chosen by the meeting shall preside—shall be held once in each year in the month of January, at which an audited statement of the Club's financial position and a general report shall be presented and discussed. A special general meeting, at which the chairman or a member of the Committee chosen as aforesaid shall preside, may be convened at any time by the Committee; and it shall be convened at the request in writing to the secretary of not less than one-third of the members.

15. **Amendment, etc., of Rules.**—These rules may be amended, rescinded, or added to by resolution passed at a special general meeting by a majority of not less than two-thirds of the members attending the meeting.

16. **Dissolution of Club.**—The Club may be dissolved by resolution passed at a special general meeting by a majority of not less than two-thirds of the total members.

17. **Disposal of Funds.**—Any funds remaining to the credit of the Club on its dissolution shall be disposed of in such a way as may be determined by resolution passed by a majority of not less than two-thirds of the members attending at a special general meeting held subsequent to that referred to in Rule 16.

18. **Notices.**—Fourteen days' notice of a general meeting and of every special general meeting shall be given to every member. The business to be transacted at a special general meeting shall be stated in the notice convening the meeting.

XIII

A. THE HYGIENE AND CONSTRUCTION OF PIGSTIES

The welfare, profitable breeding, rearing, and feeding of pigs depend much on their being suitably housed. Many breeds, especially of the pure kind, are very susceptible to changes in the weather. The sow at breeding-time may be injuriously affected by a cold, draughty, damp habitation; the litter and weaners will need warmth to get on; the fattening hog requires a temperature neither too hot nor cold. Therefore, as first essentials in the construction of sties and the satisfactory bringing up of pigs, dryness and warmth need primary consideration. The ideal sty is one warm in winter and cool in summer, dry, well ventilated, and free from draughts, where cleaning, feeding, and littering can be carried out without loss of time.

The ground upon which a pigsty is erected should be high and dry, and if having a natural slope, so much the better. Water and liquid manure should run or drain easily away from its surface. If the site be level and the surrounding earth damp, it will be well to raise the floor of the sty about $\frac{1}{2}$ foot above the neighbouring ground; raised dwelling bottoms for animals are always advisable in order to secure dryness and drainage fall. A permeable subsoil helps to insure dryness.

Places where stagnant pools stand about, rainfall is badly soaked up, and dampness always prevails, are unsuitable and harmful as sites for piggeries unless

trenched and well drained. A good surface for the erection of sties may be made by digging up the ground for a depth of about 1 foot (if the subsoil be dry about ½ foot will do), and filling in the space with firmly-stamped broken brick or porous stone and pieces of smashed glass, if obtainable, to keep out the rats. The last-named bring disease (ringworm, swine fever, trichinosis, etc.), consume food not intended for them, even frighten the pigs away from their trough, and frequently destroy the floor. As a ridder of these pests, where they occur, a German authority recommends using dilute sulphurous acid to cleanse the walls and flush the drains of sties, for rats flee from the smell of this chemical.

The floor of the sty sloping away from back to front causes drainage to flow in the right direction, and facilitates cleansing operations. The best one should be impermeable, and furnish a warm dry surface for the swine to lie upon. Staffordshire bricks grouted in cement, or well-burnt bricks set on edge in sand, have their advantages. Specimens such as the one illustrated are frequently used for paving the yard or court of pigsties. They have the gain that the drainage runs along the bricks lengthways, only occasionally crossing or lodging in a joint between the bricks, and they are easily swept clean with the brush. Concrete, of 1 part of good cement, 3 parts of gravel, and 6 parts of well-crushed rubble, makes a durable and not too slippery floor. It should be laid down 4 or 5 inches thick on a broken stone foundation, which has been stamped, covered with gravel and a thin coating of cement; the concrete may be grooved, if required (Nörner). Asphalt 1 inch thick —laid on concrete—may be used, but it has a tendency to sink and become full of holes. Concrete is now largely

used for building purposes, in making foundations and walls. Its composition is usually Portland cement, sand, and coarse aggregate (broken brick, clinker, or "beach"). The proportion for foundations and walls may be 1 of cement, $2\frac{1}{2}$ of sand, and 5 of aggregate.

Flag or stone floors get wet and slippery, and are always cold. Well-rammed chalk, with the surface dressed with tar and ashes, makes a fair improvised dwelling-ground. Wood is often used in the form of railway-sleepers or spars. It furnishes a warm resting-place, but soon becomes dejecta-sodden or rotten; whilst, if disease arises, it harbours the germs of infection, and cannot be adequately sweetened and disinfected. Rats get under wood floors, and if dying there, may be answerable for the death of a litter of pigs, if not for the mother animal herself. The smell from the putrefying rodents upsets the sow's milk, and causes fatal scour in the sucklings. The writer well remembers a case where this occurred, and the sty was not rendered habitable again until the whole of the flooring had been removed and renewed.

The Walls.—Perhaps the best walls are made of brick. If warmth is much desired and expense not too great a consideration, a thickness of one and a half blocks is advisable. Concrete of the strength of $\frac{1}{2}$ foot, made of 1 part of cement to 5 to 10 of gravel and sand, may be used. In some places concrete blocks are manufactured, which, when employed, form a warm, dry wall, very suitable for piggeries. On the Continent beaten calcareous sand (*pisé*) makes cheap and efficient supports. Many sties are now wholly erected of iron. They are quickly put up, and answer their purpose well. Smooth surfaces inside the sty, where rough

material has been used in the structure, may be attained by plastering the walls. The interior aspect being smooth facilitates washing and cleaning, which tend to keep the inside air of the sty sweet and pure. Wooden walls are open to the same objection as floors of this material, and, in addition, may harbour more vermin of the creeping nature. If woodwork must be used, it should be of well-seasoned elm or oak, and may be rendered more lasting if creosoted (English Brothers, Wisbech) or preserved with sideroleum (Anderson and Son, Ltd., Old Ford, London). All breeding sties require a low rail round their inside about ½ foot to 1 foot high, and 4 to 8 inches from the wall. The rail, made of tubular iron, prevents the sow crushing her offspring, enabling the little ones to get under it when likely to get pinched.

The roof is apt to be overlooked as a retainer of warmth and excluder of wet. Corrugated iron all in one piece can hardly be beaten as regards keeping out rain and damp, but, unless boarded or felted inside, it does not retain the required amount of warmth. If woodwork is used for the roof, it may be coated externally with benzol tar or carbolineum, and lined inside with dry, narrow boarding, over which asphalt paste may be put. Thatch makes warm roofing, but should be well done, and skilled thatchers nowadays are scarce. Slate and tiles furnish appropriate coverings, but in many districts are expensive. As the insides of roofs are subject to vapoury emanations from the sty, it is advisable to cover any internal roof woodwork with damp-proof material. Asphalt paste answers well for the purpose if a fairly level surface is present.

Stoniflex roofing-felt (Messrs. D. Anderson and Son, Ltd., Belfast and London) makes a comfortable and

warm covering for pigsties. It is laid on boarding, and when a coating of mastic of a bituminous nature has been applied to the felt, it will last against all weathers for a period of from four to five years, and is watertight. At the end of this time another coating of mastic will renew it for a further space of time.

The pig dearly loves *air and light*. Good ventilation means the egress of bad, used-up, vitiated air, and the entrance of fresh, pure atmosphere. Appetite, good blood-supply, growth, and health all depend largely on oxygen-rich air. Foul emanations may go out through the windows, if any be present, or by air-holes under them. Pure breezes are admitted by canals leading down from under the windows to the ground, or by 6-inch fireclay pipes in the walls. In big piggeries air-shafts may be conducted through the roof and suitably covered outside. Five hundred and twenty-five cubic feet of air per head an hour answers all requirements.

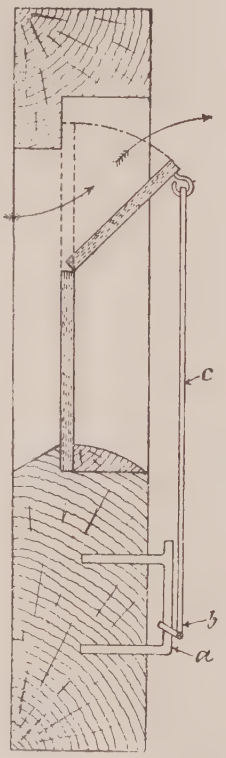


FIG. 23.—VENTILATING WINDOW. (Arnim, Criewen.)

Windows placed about $3\frac{1}{2}$ feet from the ground on the sunny side of the sty will throw light well into it, and at this height the pigs will be able to escape a draught when the window is open. If the top half opens inwards and upwards so much the better. The above illustration represents a pigsty window recommended by Herr Arnim, of Criewen. A flat iron rod, *c*, penetrated at the end, runs on the flat rail *a*, and is fastened by an eye to the top of the window. The pressure of the window

fixes or jams the iron at *b* at any position desired on the rail *a*.

Light is not so necessary, and, in fact, by many it is considered undesirable in fattening sties. Darkness means sleep, rest, and the putting on of adiposity.

Air-Space.—One hundred and fifty to two hundred cubic feet per pig is the amount recommended in this country. The temperature in a healthy sty should be about 58° F.

Drainage.—The mouth of the drain inside the sty is best trapped, and the outlet far enough away for the bad odours not to pervade the premises. Urine, thin dung, and water running well away to the drain saves labour. The well-sloped floor is one in which the liquid drainage all runs to one spot, can be easily brushed out of the sty, and pass away by the channels or drains to a catch-pit or into the outside yard. A central well-made channel dividing the sty into two halves is convenient. The smell from piggery drainage must not be wafted into dairies, dwelling-houses, or pervade the highway; hence a suitable distance from these and a proper aspect are desirable. A trapped drain pot in the centre of a pig-yard has manifest advantages. It should be provided with a movable basket to catch solids and prevent them being washed into the drain, and a hinged cover over a small inspection hole, through which a rod can be passed if any stoppage occurs in the drain. The drain-pot is made to take one to four gutters. Another trapped drain-pot is made with a form of outlet usually for 4-inch drain-pipes, but can be had for 6-inch pipes also. Both these drain-pipes will take one to four gutters.

Dimensions of Sties.—Sufficient room for the inmates to move about freely and to enable cleansing

operations to be conducted easily is of first importance. A farrowing sow will need plenty of ground for herself and family, stores adequate space, and a fattening hog room to move about a little.

The following measurements for sty floor-space are good ones:

	Square Feet.
For a young pig	5·25 to 6·3
For a store up to 65 lbs. weight	8·4
For a store over 65 lbs.	10·5
For a fat hog	16·8 to 21
For fat swine, several in a sty, per head	12·6 to 16·8
For a breeding sow	41
For a boar	35·7 to 40·95

With these dimensions it is recommended that a height of 7 to 9 feet exist in a sty, according to the number of inmates kept therein. To those who frequently bump their heads on the roofs of pigsties, to the attendant, and to the bad stooper, sufficient room to stand upright has its value.

This floor-space, taken all round, is rather bigger than that usually given in this country. Plenty of moving room is good for the health, limbs, and growth of pigs.

Mr. James Long, in " The Book of the Pig," gives the following as suitable-sized apartments for swine:

	Feet.
A breeding sow:	
Large breed	7 by 7
Middle White or Berkshire	6 by 7
Small White or Small Black	6 by 6
A boar:	
Large breed	7 by 8
Middle White or Berkshire	7 by 7
Small White or Black	6½ by 6½
For litters:	
Large breeds	8 by 8
Middle	8 by 7
Small	7 by 7

Cleanliness in and about the Sties.—This is important. The cleansing of pigs' abodes is daily effected by means of a stiff broom and plenty of water. One only leaves the suckling sow undisturbed, but her surroundings may be quietly cleaned also when she cannot be let out. In other cases when the inmates are outside

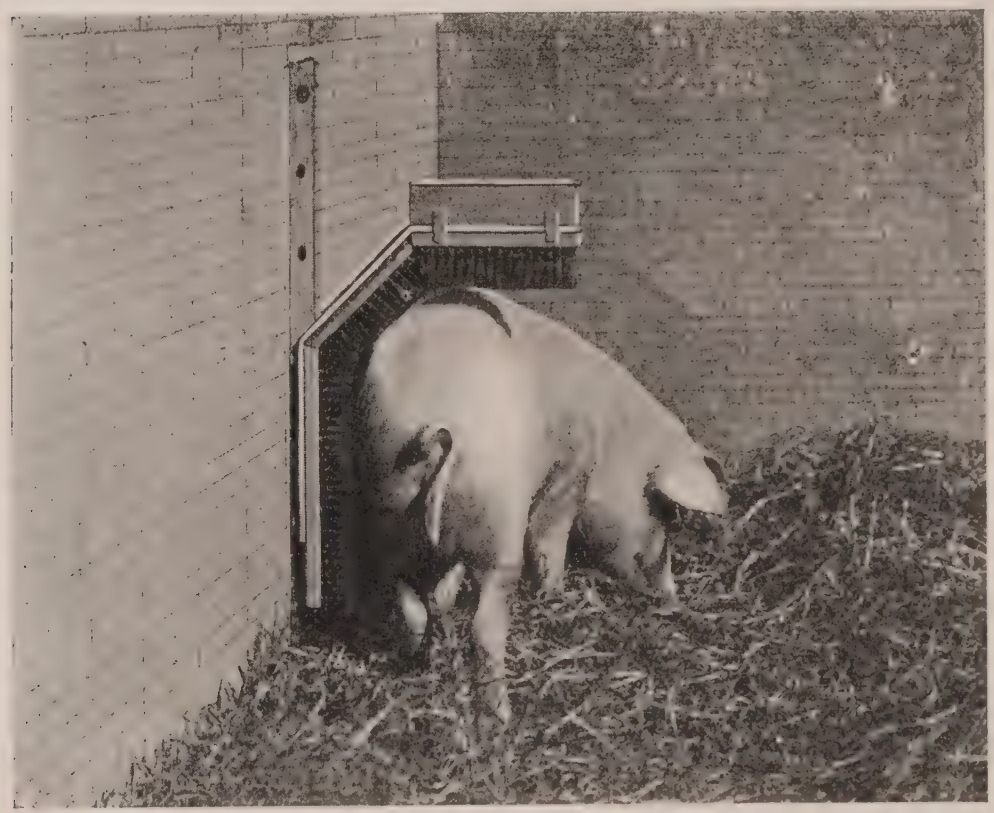


Fig. 24.—Pig-Cleaning Brush. (After Nörner.)

in the court, dejecta may be removed from the inside abode, windows and doors set open, according to the temperature, to let in the pure, fresh air and to drive out impure, high-smelling odours. Cleanse the troughs carefully, sweep out the passages and channels. A well-constructed and ventilated sty never smells badly, and where cleanliness is neglected pigs will not grow and

thrive. In warm weather the walls and floor may be swilled down with water, and all bad-smelling material removed. When the apartment is dry, fresh clean litter—straw, sawdust, or chaff—may be put down and the pigs let in again, if it is not advisable for them to be in the court or out at pasture too long. About 3 lbs. of straw daily is sufficient for a full-grown pig (May). Cleansing operations must not make the abode too cold, and in winter carbolic or creolin solution swabbed or sprayed about will tend to make the air of the sty sweet. It is very important that sour food does not remain in the troughs, and wooden ones, which are troublesome to keep right, may be brushed out every week with limewash.

Pigs' bodies need attention as regards cleanliness. Where there is a bench in the sty, and fresh, dry litter put on it, the animals will keep themselves clean and deposit dung and urine away from their bedding. A bath put in the court in hot weather will be well used by swine. If this is not available, their bodies may be rinsed with lukewarm water and wisped dry with straw, or they may occasionally be washed, brushed, and dried. Naturally, they like to rub their bodies up against something, and an ingenious brush fixable to the wall and a scratching device as illustrated are appreciated by them. When let out to pasture, they seek out water to bathe in in hot weather, or root up damp places, lying or rubbing their bodies thereon. A watering-can comes in handy at times to give them a cooling, refreshing shower-bath. For the good of swine the skin must be kept active. Attention to its hygiene causes them to do well, and makes a supple, glistening cuticle—not thickened, hard, scaly, and scabby. It is always wise to have a vacant

sty where a number of pigs are kept, so that if disease breaks out a separate, clean apartment may be at hand for healthy stock. Tar, whitewash, and quicklime on the floor are suitable germ destroyers in places where illness has broken out. When used systematically and periodi-

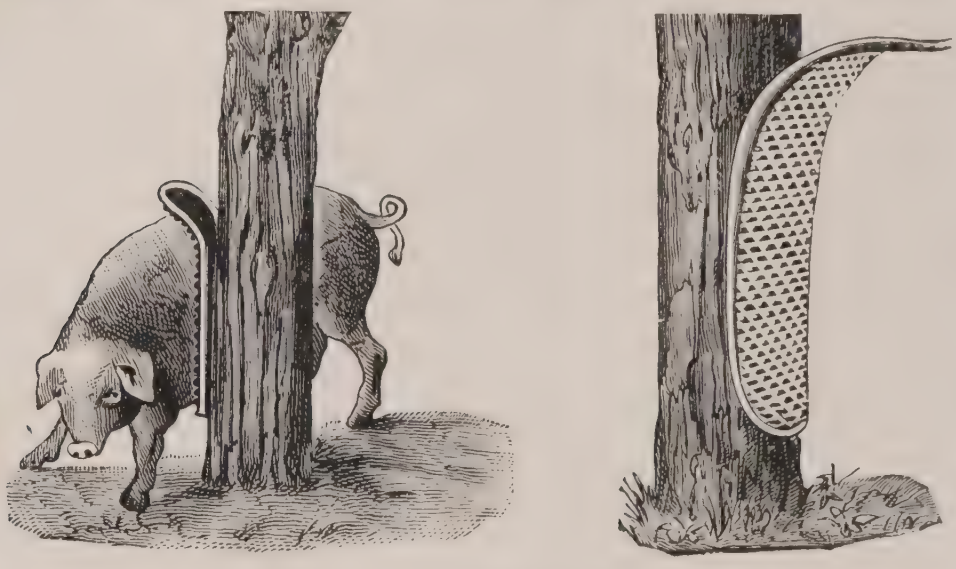


Fig. 25.—Scratching Devices.

cally, they help to keep ailments away. A mixture of coal-tar and pitch is about the best application to woodwork. After removal of dung and urine in habitations where disease has occurred, walls and floors may be scrubbed down with soda and hot water, rinsed with creolin solution, and then treated with tar and whitewash.

B. TROUGHS

Durability, impermeable material easy to be cleaned, a separate feeding division, and utensils that will not be overturned or easily pushed about, are points to be desired in troughs. Stone ones are largely used in some parts of the country; wooden troughs are plentiful, but are not desirable, for they are always hard to clean

properly, becoming food-soaked and sour-smelling; glazed earthenware and iron troughs are the best. The last-named, if built in the wall of the sty, as illustrated, are excellent.

Each set consists of cast-iron feeding trough, 48 inches

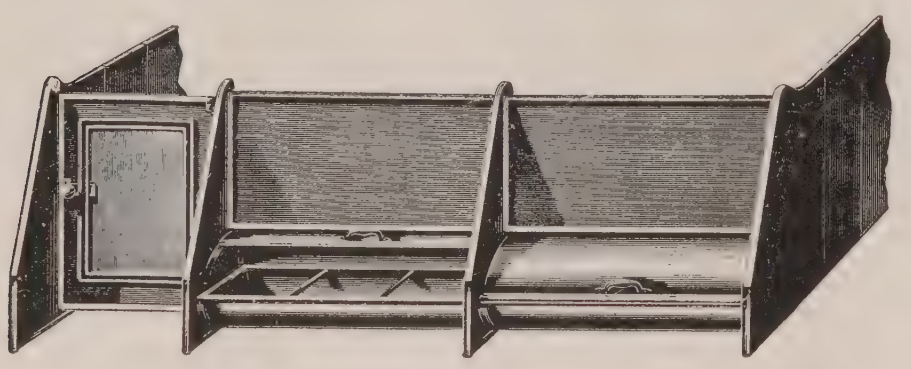


Fig. 26.—Troughs. (Carron Co.)

long by 16 inches wide, and $7\frac{1}{4}$ inches deep, with round bottom and round wrought-iron cross-bars. The cast-iron swinging division is worked by a lever handle, which can be fastened to either side of the trough, and the pigs allowed to feed or otherwise, as desired (Fig. 26). Another desirable food-holder, made by Messrs. Hill and Smith, Ltd., Brierley Hill, Staffordshire, is here represented (Fig. 27). This trough is 6 feet long by 4 feet high, with strong cast-iron ends, prepared either for building in a wall or fixing to a railing.

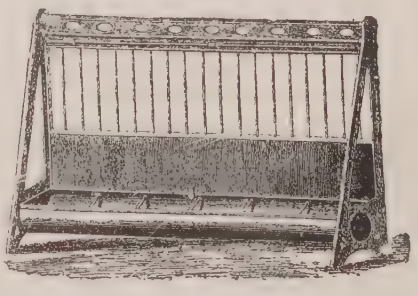


Fig. 27.—Cast-iron Oscillating Trough. (Hill and Smith.)

If movable, food receptacles are to be thoroughly cleaned before meal-times, which is always desirable; they must be turned over to remove all dirt, remains of

food (which in good feeding should not be present, but sometimes is), and excrement. Every day cleanse them

Fig. 28.—Circular Troughs. (Carron Co.)

with boiling water. Thorough cleanliness cannot be laid too much stress on if feeders are to be kept healthy.

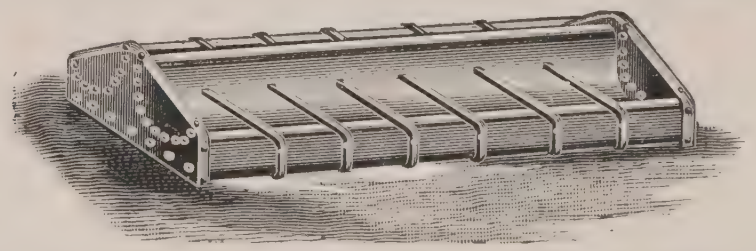


Fig 29.—Trough for Young Pigs. (Hill and Smith.)

Good movable troughs for young pigs are those illustrated (Fig. 28), made by the Carron Company. One

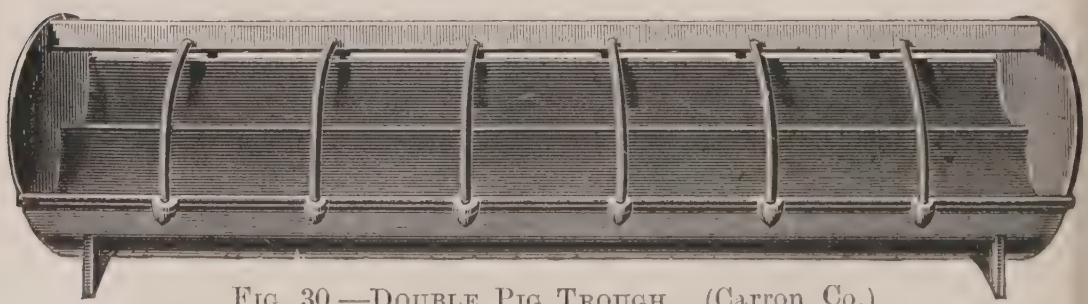


Fig. 30.—Double Pig Trough. (Carron Co.)

has a cast ring at the top for pouring in food while feeding, a cast centre dome for keeping the food at the front of the trough, and wrought-iron division bars.

The food receptacle (Fig. 29) is useful for young pigs, and is so constructed that they cannot get into it. It is a double one, 3 or 4 feet long, and made of wrought-iron, which can be galvanized.

Fig. 30 represents a double trough, and Fig. 31 a

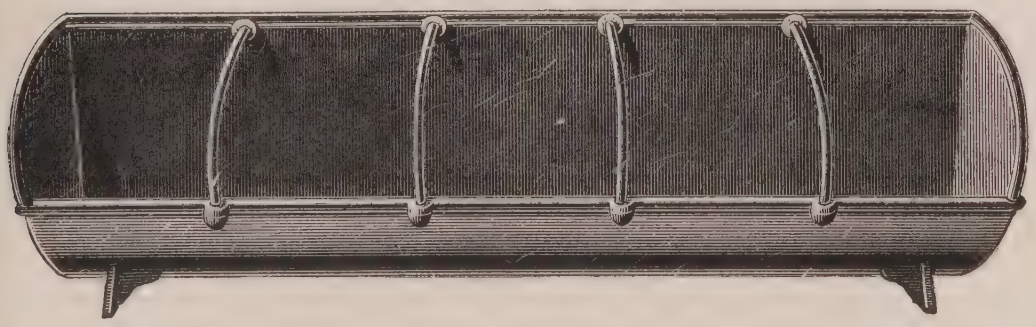


Fig. 31.—Single Pig Trough. (Carron Co.)

single one, higher at the back than front, to prevent food being thrown out. The cross-bars are of round wrought-iron.

Fig. 32.—Sections of Figs. 30 and 31.

C. TYPES OF PIGGERIES AND STIES

Sties may have open or closed fronts, and a court sufficiently large for the inmates to move about freely. The open-fronted ones are apt to be cold in winter, especially if not having the right aspect. Whether open or closed, the main opening should face south. The

entrance to the sty is placed in the left side, and the pigs' lying-place inside on the right. A building for

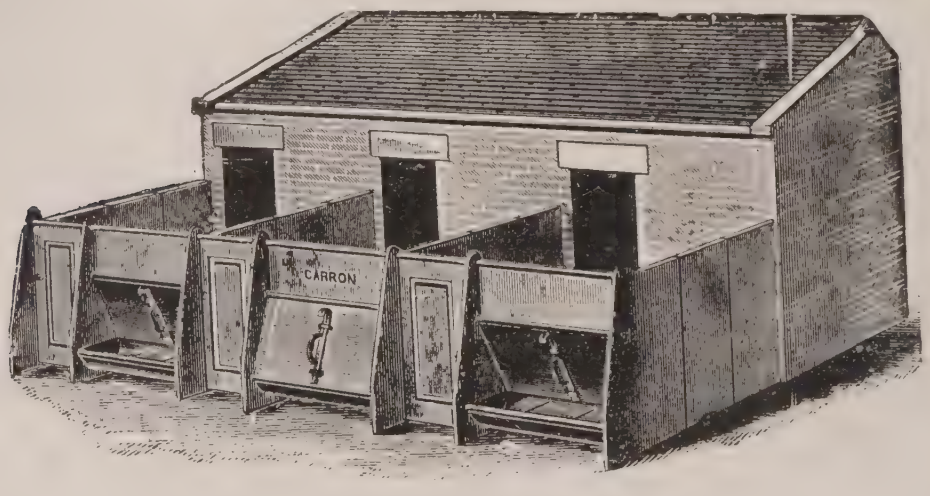


Fig. 33.—Pigsties. (Carron Co.)

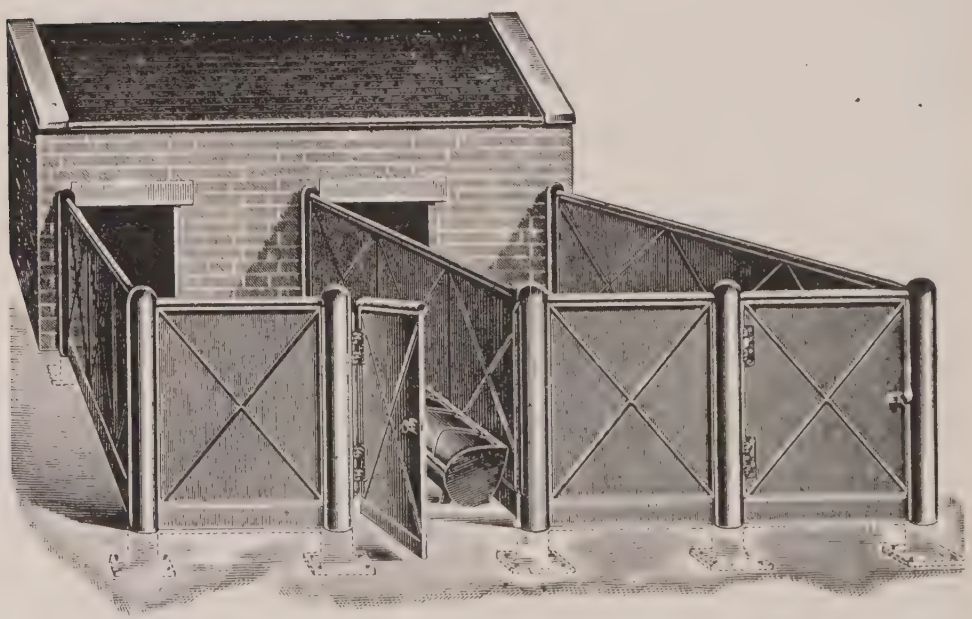


Fig. 34.—Pigsties. (Carron Co.)

a sow and litter may be about 9 feet by 11, with the front wall 6 feet high, and the back one 8 or 9 feet, giving a cubic space of about 700 feet. The outer yard may be the same size.

By making the sties about 3 feet 6 inches larger at the back or high side, a passage may be run from end to end of the building, separated from the pigs by

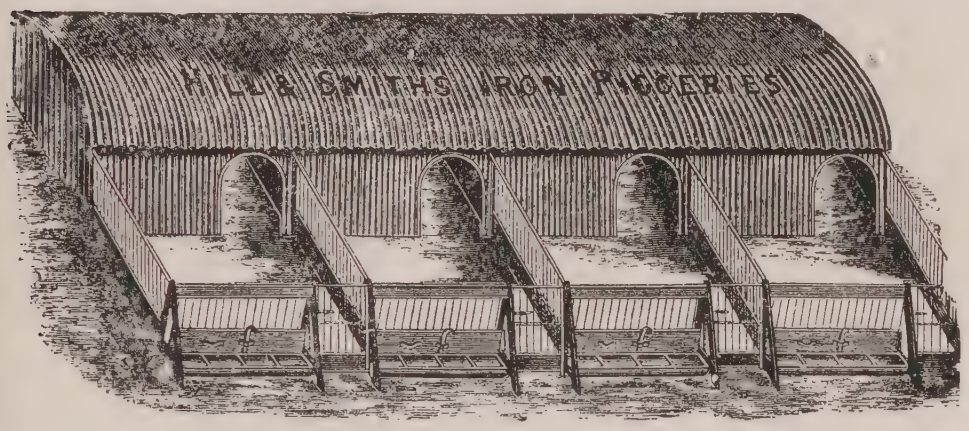


Fig. 35.—Piggeries. (Hill and Smith.)

4-feet-high iron walling, with 2-feet-wide iron doors giving access to the sties; this makes a very convenient arrangement and increases the cubic space.

A corrugated-iron roof covering the inside and *outside*

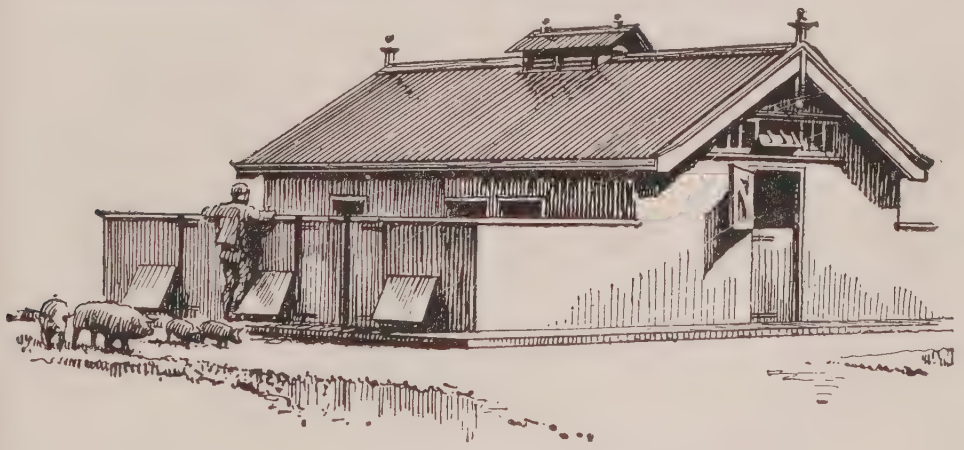


Fig. 36.—Piggeries. (Boulton and Paul.)

courts of the sty has its advantages. By means of it dryness and warmth may be secured in the pigs' dwelling, whilst ventilation is effectively arranged for by openings

in the sides of each compartment. The pigs are fed in front from a swinging trough, and drainage is passed away by an open channel down the centre of each sty and into a drain outside the piggery.

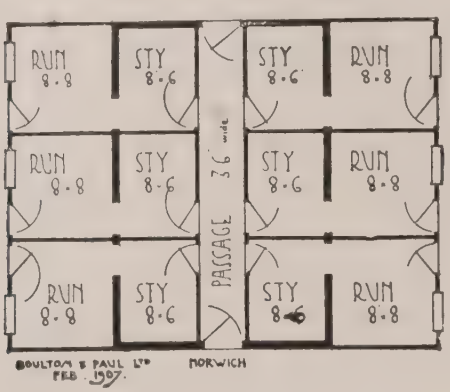


FIG. 37.—PLAN OF FIG. 36.

FIG. 37A.—PLAN OF FIG. 38.

Views of good pig-houses and yards are given in Figs. 33 and 34. The yards in Fig. 33 are suitable for erecting in front of existing pig-houses. The front of

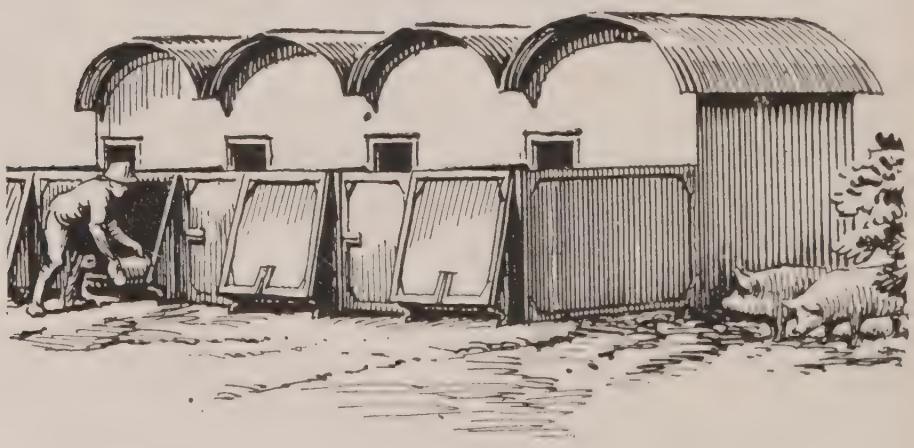


FIG. 38.—PIGGERIES. (Boulton and Paul.)

each yard consists of a cast-iron feeding-trough, $48 \times 16 \times 7\frac{1}{2}$ inches, with cast-iron panelled door, 22×40 inches, having strong hinges and sliding bolt for fastening. Each yard comprises an area of, say, 6 square feet, on

two sides of which a division is necessary, composed of three cast-iron plates well fitted and bolted together, while ends are secured and battened to the pig-house.

Whilst cleaning or feeding, the swing division is bolted

Fig. 39.—Movable Sty. (Boulton and Paul.)

behind the inside edge of the trough, after which the division is drawn forward and bolted to the outside edge of the trough, giving access to its full breadth during feeding.

In Fig. 34 each set of piggery fittings consists of three posts, each 4 feet $1\frac{1}{2}$ inches wide and 5 inches deep, with $10\frac{1}{2}$ inches square flange for fixing; two half-posts, $4\frac{1}{2}$ inches wide, $2\frac{3}{4}$ inches deep, and 4 feet $1\frac{1}{2}$ inches high; front panel, 2 feet $5\frac{1}{2}$ inches wide, and 3 feet 6 inches high, and bedded into cement at bottom; two divisions, composed of three cast-iron panels, 3 feet

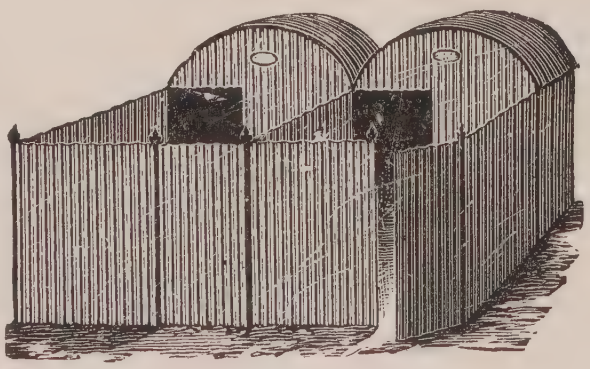


Fig. 40.—Movable Sties. (Boulton and Paul.)

1½ inches wide, and 3 feet 6 inches high; door, 2 feet 5½ inches wide, and 3 feet 3½ inches high, having strong hinges and sliding bolt for fastening.

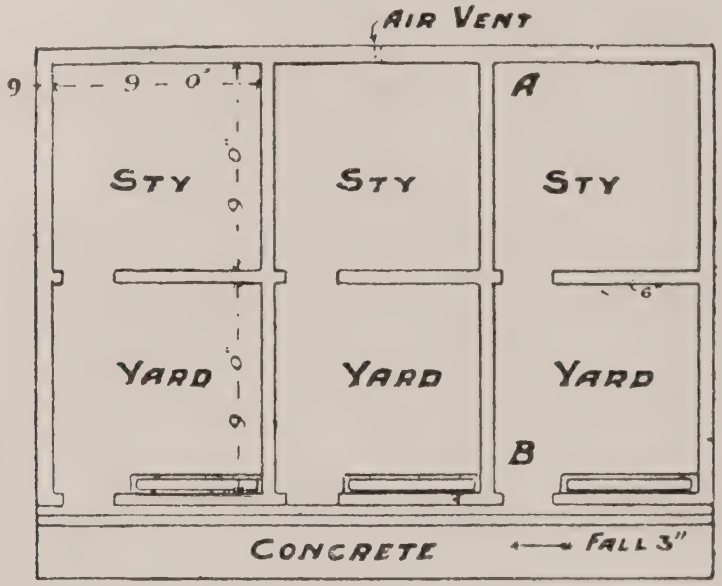


FIG. 41.—PLAN OF PIGGERY RECOMMENDED BY DEPARTMENT OF AGRICULTURE FOR IRELAND.

Fig. 35 illustrates a range of Messrs. Hill and Smith's iron piggeries, consisting of four compartments, each

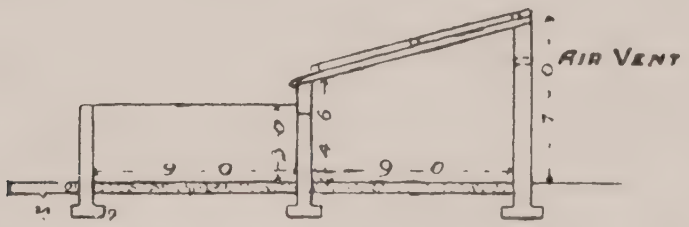


FIG. 42.—VERTICAL PLAN OF PIGGERY RECOMMENDED BY DEPARTMENT OF AGRICULTURE FOR IRELAND.

with a yard 8 feet square, and a covered-in lodging or sleeping-place of the same size. The front of this sleeping-place is made removable, so that in summer-time it may be taken away, leaving the place open to the

yard. Each yard is provided with oscillating trough and separate gate. The division railing is made close for a foot high, and the upper part is composed of strong iron railing. The sleeping-place is covered with galvanized corrugated sheet-iron, extra strong, and walls of same.

Messrs. Boulton and Paul, Ltd., Norwich, erect iron piggeries as illustrated in Figs. 36-40.

Figs. 36 and 37 represent a range of six piggeries, runs, and ground plan. The sties are constructed of strong red deal framing, morticed and tenoned together, covered outside with galvanized corrugated iron, framed and braced doors, and gates fitted with strong hinges and fasteners, ventilating window in each gable, lantern louvre ventilator on ridge, and Eglington pig-trough in each run.

Fig. 43.—The "Witham" Hut in which the Pigs live all the Year round. (P. R. Morse. Barnards Farm, Witham.)

Figs. 37A and 38 are a range of four piggeries, runs, and ground plan. The structures are made of strong red deal framing, covered outside with galvanized corrugated iron, and have strong gates, with convenient fastenings; Eglington pig-trough in each run.

Portable and movable iron piggeries, as illustrated in Figs. 39 and 40, enable the ground of the pigs to be changed, and keep them under control. They would be

suitable for strong, somewhat rustic pigs, not requiring to be kept very warm, or for use of any class of swine

Fig. 44.—Sties of Creosoted Wood. (English Bros., Wisbech.)

Fig. 45.—Sties of Creosoted Wood. (English Bros., Wisbech.)

in summer. If their walls are lined with wood, which may be easily done, they can be made warm enough

in winter, especially if put in a dry, sheltered place with a proper aspect.

Figs. 41 and 42 are the plans of a piggery recommended by the Department of Agriculture and Technical Instruction for Ireland as suitable for a small farmer or cottager. One or more sties can be erected, as found necessary. Each sty will hold three store pigs.

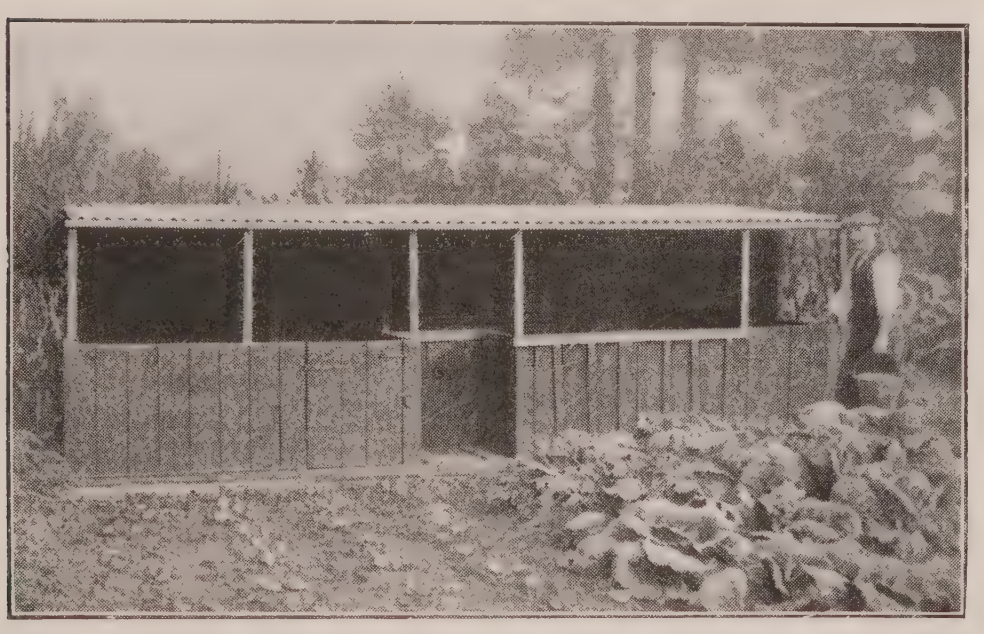


Fig. 46.—Odourless Sties designed by A. E. Haines, F.R.H.S., Boveney.

Fig. 43 is an apex house for pigs out of doors. The floor is 8 feet by 10 feet. The structure is in sections, with wooden bottom on slides to move about in the fields. The roof is of wood covered with rubberoid. The cost comes out at about £14 without floors and slides.

Figs. 44 and 45 are good serviceable sties made of creosoted wood by Messrs. English Bros., Wisbech.

Fig. 46 shows sties designed by A. E. Haines, F.R.H.S., Boveney, near Windsor, from whom full particulars can be obtained. Cost of the pair of sties, £8 to £10.

XIV

INSPECTION OF PIGS: HEALTHY PIGS—A GOOD CARCASS—DISEASED AND DEFECTIVE FLESH

It is an offence against public health, punishable by fine or imprisonment, to expose flesh for sale which is diseased, unsound, unwholesome, or otherwise unfit for the food of man. The intention of selling, or the depositing for preparation for sale, of unfit meat is sufficient, if proved, to insure conviction in London. The seller or sender of diseased carcasses may be proceeded against, and is liable to punishment. A public health officer or sanitary inspector may enter premises at all reasonable times to inspect meat, and if he be prevented or obstructed in his duties, the hinderer puts himself within reach of a fine.

The maximum penalty for each diseased carcass exposed is £20, or three months' imprisonment without a fine. For obstructing an officer the largest fine is £5; and where a search-warrant is granted, and the searcher is impeded, the highest penalty is £20.

Any person convicted twice within a space of twelve months of dealing in diseased meat may have a notice of the fact fastened to his or her premises for twenty-one days, and be liable for any costs incurred in affixing the placard.

In Scotland live and dead animals are subject to inspection, and if diseased, it must be proved that they were not exposed, deposited for sale, nor intended for the

food of man, if the offender is to escape the penalty. If a person did not know, and could not have reasonably known, that the animal or carcass was diseased, or if the one concerned be protected by a veterinary examination certificate, stating that the animal or carcass is fit for food, the penalty or imprisonment is escaped.

In Scotland sellers or senders of diseased meat are also liable to punishment.

The proper carrying out of meat inspection necessitates an examination of the animal both before and after death. This can only be done widely and effectively under the abattoir or slaughter-hall system—in fact, such conditions alone can insure a thoroughly safe and satisfactory meat-supply. Most animals and carcasses undergo no examination or inspection in this country, and in not a few cases where inspection exists it is limited to the shell or part of the carcass of a slaughtered quadruped, the animal being cut up or the viscera removed before the inspector sees it. If there is no universal and uniform inspection of home-supply, what can be said about imported carcasses? In many cases there is no official inspection at the port of embarkation; hence the greater need for keen supervision at the place of arrival.

Tuberculosis, anthrax, pneumonia, trichinosis, measles, ptomaine-poisoning, etc., may all be contracted by eating infective or poisonous flesh. The sources of our animal food from abroad are wide and numerous, and a rigid inspection of it seems desirable in the interests of public health and the welfare of the State. Tinned food and dairy products need similar supervision.

We have written that proper inspection should include an examination of the living animal. By this procedure

an inspector, if he is a veterinary surgeon, can come to his examination with a wider knowledge, and be in a position to give a better opinion as to the fitness of a carcass for human food. He will see whether an animal is suffering from a disease injurious to the flesh. He may advise an owner to treat an animal for a time before having it slaughtered, and thereby enable him to avoid losing money. He will be able to notify a disease coming under the Contagious Diseases Animals Act possibly before infection has been widely spread.

(*a*) What are the conditions present in **healthy pigs?** They generally move about freely, grunting and snuffling, with head declined and tail curled; they have an intelligent look, are lively, and take notice of their surroundings. If an attempt is made to catch them, they run or move quickly out of the way, and when caught, give mouth in no uncertain manner. Healthy animals before slaughter are generally well nourished. The skin is fairly firm, especially over the ribs in fat swine; the hair smooth and glistening; the surface of the body an equal temperature all over, except, perhaps, at the feet and point of the ears. A good appetite is present, and food eagerly taken.

Normal swine-dung is cylindrical or pulpy, clay or greyish-yellow in colour. The lips of the vulva in sows will be close together, not swollen, no discharge from them, and the mucous membrane rosy red; the snout will be moist, with no thick or tenacious slime or mucus in it; breathing will be regularly performed, 10 to 20 respirations per minute. Disturbance, great heat, the vicissitudes of travel and transit, increase respiratory movements. There should be no coughing; but if it occurs, loud and full is the healthy note, not husky,

suppressed, or continuous. The temperature of any doubtful subjects may be taken; in the healthy, undisturbed adult animal it stands at 102$\frac{3}{5}$° F. In quite young pigs it may be 103° F.

The heart-beats, felt close up behind the left elbow, are regular and strong; the pulse, taken at the artery inside a fore or hind leg, will be plainly detected. Both will average seventy to eighty strokes a minute. Increase of pulse-beats without fever may indicate excitement, pain, or heart affection.

(*b*) In a **good carcass** the blood from the death-wound will be red and fluid, gradually clotting to the shape of the vessel from which it flows. In a well-bled cadaver there should be little trace of blood on incising the muscular tissue or liver. Healthy lungs, taken from a pig soon after slaughter, will have their surfaces smooth and glistening, be light rosy red, and later darker in colour; when cut with a knife and pressed, a reddish foam or froth exudes from the alveoli and bronchi at the cut surface. Sound lung feels resilient and elastic; a piece floats in water when cut off and put therein. The lungs of swine have two to three lobes on the left, and three to four on the right side. Healthy lungs collapse when taken from the thoracic cavity.

The tongue of the pig is narrow, with a rounded end and fine, thread-like, round papillæ.

The heart-bag, or pericardium, is smooth and glistening, containing a small quantity of clear, colourless fluid, devoid of odour. The heart is formed of cross-striped muscular fibre; is conical in shape; the muscle is reddish-brown in colour, and of firm consistence. The grooves of the heart contain white or yellowish-white fat.

The liver of swine has a smooth and glistening surface,

with four big lobes, and two little ones called the Spigelian and quadrate lobes respectively, the latter being the smaller. The colour is clear reddish-brown, becoming dark brown; in pregnant animals it may be reddish-brown and dull. The lobules are plainly visible. The average weight of a healthy porker's liver is about 3 lbs.

A healthy animal's stomach and intestines are smooth and glistening externally, and their walls whitish or bluish-grey. The mucous membrane of the intestine is greyish-yellow, velvety, and slippery. At the deepest part of the great curvature of the stomach the membrane has a brownish-red, and during digestion a bluish-red, colour.

The colour of the spleen immediately after slaughter is red, and later dark red; it is of soft consistence, tongue-shaped, moderately arched, and, on section, three-edged. It weighs about 4 ounces.

The kidneys of healthy animals are large, of firm consistence, smooth, glistening externally on their cut surface. The colour of the secreting glands in fat swine may be yellowish-brown and dull. They are about 4 inches long and weigh about 4 ounces each.

Externally, the womb in a sound cadaver is greyish-white or red, and the mucous membrane yellowish or reddish-grey.

The muscular tissue (lean) of pigs is pale red to greyish-red, and in old animals may be darker; the fat in a good carcass is white, firm, fine-grained, and smooth.

The thin membranes (pleuræ and peritoneum) of the chest and abdomen are smooth, glistening, clear grey, and transparent. The long bones will be dense and compact, greyish-white or yellow, and the marrow firm, greyish-white, or yellow in colour. Bones form the

Plate XII.

Fig. 47.—Internal Organs of a Pig after Complete Opening of the Abdominal Cavity. (After Ostertag.)

Plate XIII.

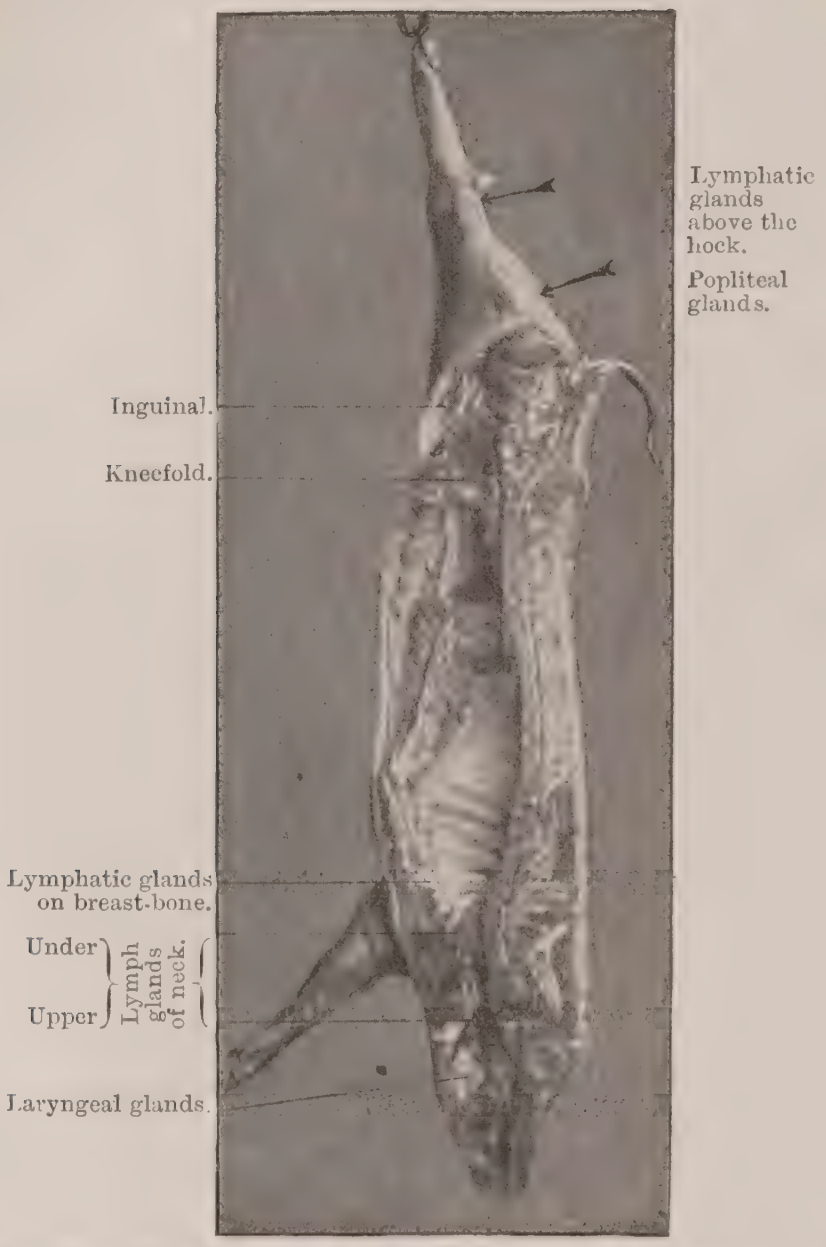


FIG. 48.—PIG SEEN FROM WITHIN, SHOWING POSITION OF LYMPH GLANDS. (After Ostertag.)

skeleton, and serve for the attachment of muscles and ligaments. They comprise, in union with joints and muscles, the movement apparatus, give shape to the animal, and protect the viscera.

Pig fat is white in colour, somewhat soft, and very greasy.

In lean animals there is little fatty tissue, but where there is no disease the muscles are firm, not tough, neither damp, flabby, nor disintegrated.

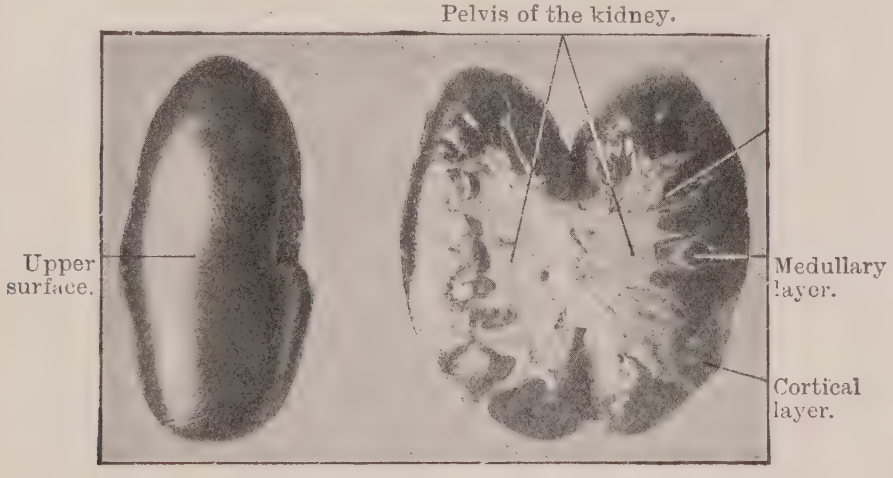


FIG. 49.—KIDNEYS OF PIG: UPPER SURFACE AND SECTION.

The lymphatic glands of healthy animals have a firm, smooth consistency, and a yellowish-white to greyish-white colour. Those in the flesh are firmer than those in the viscera. The ones visible to the eye on opening a slaughtered animal are often coloured red.

Boars, sows, hogs, and "nuns," or neuters (spayed sows), may be distinguished by the inspector; in male swine the remains of the penis may be found at the ischium. Testicles in some boar carcasses may be hidden in the abdomen.

The intestines of the pig measure about 70 feet in length.

(*c*) **Diseased and Defective Flesh.**—Many of the illnesses of animals cause diseased and defective flesh. Some of them make the meat distinctly injurious to man, whilst in other cases the tissues of the carcass furnish very unsatisfactory and innutritious food.

Animal parasites are low organisms which exist occasionally, or at certain times, or during their whole life on other animals, and are nourished or fed by them. **The animal parasites communicable to man** through pig-flesh are not numerous, and comprise *measles* and *trichinosis*. Swine measles, or the injurious cysticercus of swine, is caused by the youthful form of the *Tænia solium*.

Mankind eating flesh containing live cysticerci becomes affected with tapeworm, and swine eating food soiled by human fæces containing the tapeworm eggs become infected with measles.

Tapeworms are the adults, formed by a head and a chain of segments or links. The end segments become ripe, and are voided with the fæces of the affected subject. From the eggs contained in these segments, when taken up by swine, measles arises. The eggs reaching the porcine stomach, their shell is softened and digested by the gastric juice; the embryos bore their way through the stomach-wall, wander into the connective tissue, or are carried by the blood-stream to different organs. After settling they become encapsuled, and take about three months to completely develop. Whilst the tapeworm always remains in the intestine, the cysticerci become parasitic on the muscular tissue or bowels.

If the bladder-worm (cysticercus) is taken into the stomach of man in his food, and thence passes into his intestine, tapeworm arises. It is said that there is danger of auto-infection in man by vomiting of the ripe seg-

ments of *Tænia solium* from the intestines into the stomach. The embryos may bore through the stomach-walls, and form cysticerci in the muscles, brain, or eyes. Thus, from the immature youthful form, the cysticercus, the mature form, the tapeworm, evolves. Cysticerci are little bladders, globe or egg-shaped, about the size of a lentil to a small bean. They are filled with watery fluid, and have a slender wall, through which a white spot may be seen, which represents the inverted scolex, or head, of a future tapeworm. The wall of the bladder forms the tail, and the head is turned down like an inverted glove-finger. Warming the bladder or pressure on it causes the head to be everted (see Fig. 50). The cysticercus is surrounded by a thin connective-tissue capsule. The head —generally about the size of a millet-seed—shows, on microscopical examination, four suckers, a frontal cap, and a hook circlet, with twenty-four to thirty-two hooks.

Fig. 50.—Cysticercus cellulosæ of the Pig, with everted Head. (After Leuckart.)

The chief seats of pig measles are the tongue, the inner surface of the thigh, the abdominal muscles, the muscular part of the diaphragm, the intercostal muscles, the muscles of the neck, jaws, and of the larynx. The subcutaneous fatty tissue, brain, and heart may be affected; the parasites have also been noticed in the lungs, liver, spleen, and eyes when wandering greatly. They may cause greyish-red discoloration of the flesh, and make it sodden. Polish, marsh, and Bohemian swine are said to be chiefly affected with measles.

Mesenteric cysts are sometimes seen on the outside

of the pigs' bowels at post-mortem or on slaughter. They are probably of microbian origin, and may be quite numerous and form a grape-like cluster. They do not seem to cause any inconvenience during life, and do not depreciate the carcass value of a pig, and are only incidents of autopsy.

Trichinosis is a disease of pigs communicable to man through infected flesh, due to a spiral worm of hair-like dimensions, called the *Trichina spiralis*. In the undeveloped larval stage it lies rolled up in a capsular envelope between the muscle fibres. When these immature trichinæ, or larvæ, are taken in by man or animals in meat food, they grow into fully-developed worms in a few days, and are then known as intestinal trichinæ. They may live approximately six weeks in the intestines of their host, and multiply largely during this time. The male worm is about 1·5 mm. long, and has a tongue-like clinging organ at its end; the female is about 3·5 mm. long, and has a rounded end. In the hind-part of the body may be seen the propagating organ, with the young visible through the skin of the parasite.

Trichinæ inhabit the intestinal canal of field-rats, house-rats, man, mice, foxes, dogs, cats, bears, etc., and after gaining access thereto, may become mature in twenty-four to forty-eight hours. Pigs become infected from food soiled by the fæces of these animals, and thereafter they may infect each other through their own excrement. After copulation the male parasite dies, and is voided in the fæces; the female bores through the mucous membrane of the intestine into its glands (Lieberkühn's), and deposits her living embryos there, which may number 1,500 to 2,000. The embryos are taken up by the lymph-stream to the blood-flow, and thence over the whole body.

In the cross-striped muscle the embryos press through the small bloodvessel walls into the muscular tissue, there roll themselves up, and later become encapsuled, a process which may take three months in completing. Calcification afterwards occurring, may occupy three-quarters of a year to a year to conclude. Calcified trichinæ may be seen with the naked eye. Muscle worms may remain for thirty years alive in a capsule or become calcified.

The parasites are very tenacious of life, resisting cold at 68° to 78° F., whilst heat of 158° F. is necessary to kill them. The cases of trichinosis in man occur through eating raw or half-cooked pork or sausages; but satisfactory cooking of trichinosed flesh by an equal distribution of the required heat through a joint is not easy. Trichinæ may exist in pickled and smoked hams for twelve days, and in sausages four to nine months.

Trichinosed flesh may be slightly or badly affected; an ounce of the latter may contain 400,000 or more encapsuled trichinæ.

The appearances of trichinosis in man and animals are much the same.* Illness begins in the second half of the first week after infection, with acute catarrh of the stomach, loss of appetite, sickness, diarrhœa, colicky pains, and vomiting. At the time when the young trichinæ are migrating and encapsuling themselves there is muscular pain, superficial painful breathing, hoarseness of the voice, difficulty in swallowing, and pain in masticating. Further characteristics are circumscribed œdema, especially about the eyelids and in the neighbourhood of the knuckles, profuse perspira-

* "Special Pathology and Therapeutics of the Diseases of Domestic Animals," Hutyra and Marek.

Plate XIV.

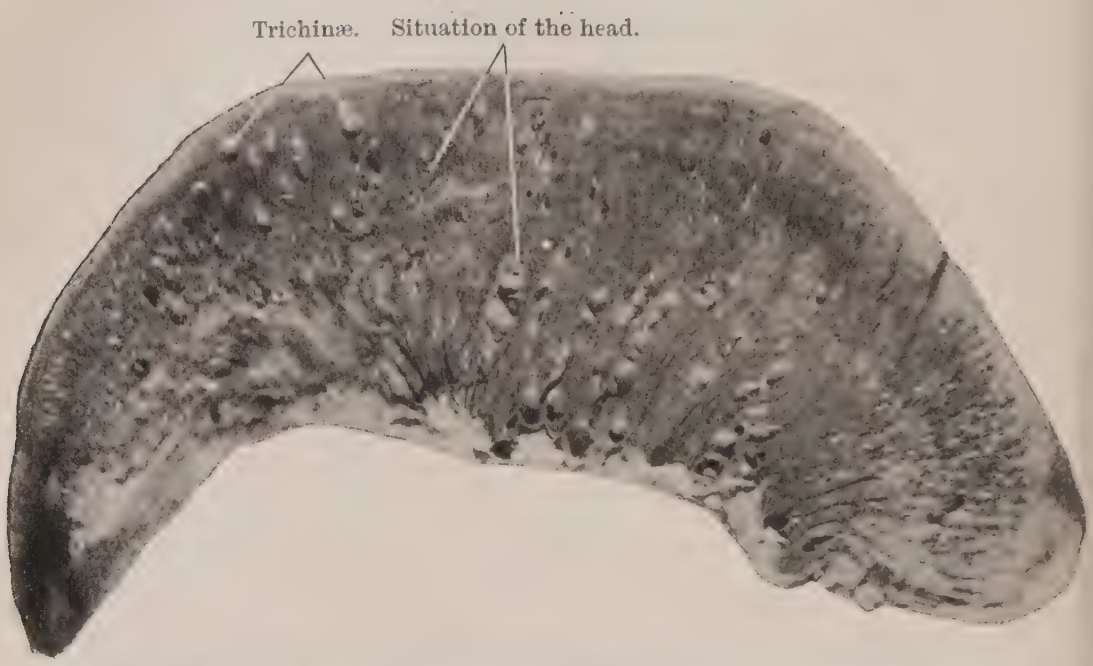


Fig. 51.—Section of a Trichinosed Pig's Tongue. (After Ostertag.)

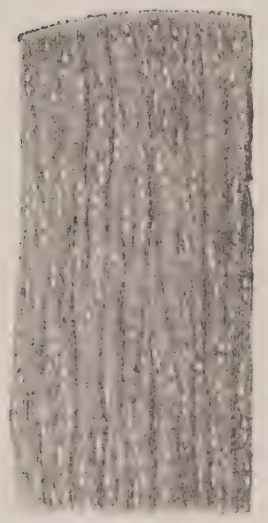


Fig. 52.—Trichinæ surrounded by much Fatty Tissue. (Natural size.) (After Ostertag.)

Fig. 53.—Chalk Concretions in the Muscular Tissue of Swine due to Miescher's Tubes. (After Ostertag.)

tion, fever similar to typhus, and finally lying with the extremities drawn up under the body.

Trichinæ in the muscles of man were first found by Paget in 1837, although Hilton, Tiedemann, and Peacock saw them in the calcified form a few years earlier.

Trichinosis was reported in Cumberland in 1871, and later at Exeter in 1909, so that it is probably very rare in our home-bred pigs, but so much pork is now imported into this country that adequate inspection of swine flesh seems desirable and necessary. It is known that outbreaks of the disease have occurred in Germany, Hungary, and North America, and that trichinosis exists in a lessened degree there still. France seems wonderfully free from it, and only one outbreak, affecting fifteen people, has been reported in Denmark. The Germans have rigorous trichinosis inspection of swine flesh, especially of the imported kind.

Parasites of Swine not Communicable to Man

1. **Miescher's tubes** are found in the intramuscular tissue of swine. They are small sausage, leather-pipe, or cigar-shaped bodies, only exceptionally visible to the naked eye (when they calcify). They then appear as white points, punctæ, or stripes. They often coexist with trichinosis, and may be mistaken for it or measles. The tubes contain numerous half-moon or kidney-shaped bodies (sporozoites). The hard white capsule of the tubes dissolves in potash lye, but that of trichinæ does not (Hutyra and Marek). *The chief situations of Miescher's tubes* and their calcifications in swine are the abdominal muscles and the muscular part of the diaphragm.

The parts affected with the sarcocysts should be excluded

from the food of man if the parasites cannot be completely excised. Where they are so numerous as to render the flesh discoloured or watery, the whole carcass, with the exception of the fat, should be confiscated. It is noteworthy that these parasites may occur in conjunction with calcified measles or trichinæ.

2. **Cysticercus tenuicollis,** or the thin-necked bladderworm, is found in the mesentery, omentum, peritoneum, pleuræ, and liver of swine, and occasionally the lungs, generally covered by peritoneum or pleuræ, and is about the size of a Victoria plum. It is the youthful form of the *Tænia marginata* of the dog. It seldom enters the intestines, and does not, like the *Cysticercus cellulosæ*, attack the flesh. It makes little passages in its wanderings, dark red, brown, or green in colour. It has thirty-two to thirty-six hooks, in a double row.

Cysticerci die if heated to 120° to 122° F. Under ordinary circumstances they are tenacious of life, and have been found in the body forty-two days after death of the host. The segments of the tapeworm of the dog containing the eggs are taken up by swine when rooting or grubbing about.

3. **The Tænia echinococcus** is the three or four linked tapeworm of the dog. Its eggs are deposited on the pasture or food of swine (green or otherwise), and the pigs thus taking them up may become infected with echinococcic cysts in the liver or lungs. These cysts may be from a pea to a cricket-ball in size, or larger. If the diseased pig's organs are given to the dogs they, again, may become infected with tapeworm. Men may suffer as hosts through water, raw greens, such as salad, spinach, or celery, which have been imperfectly cleaned, and on which the eggs remain.

Plate XV.

ROYAL COLLEGE OF
VETERINARY SURGEONS

Fig. 54.—Mesentery of a Pig infested with Cysticerci Tenuicollis. (After Ostertag.)

Plate XVI.

Fig. 55.—Liver of a Pig with Numerous Echinococci.
(After Ostertag.)

The echinococci have a thin wall, consisting of a greyish-white opaque skin, inside which is a clear fluid. On the inside of this skin are several chambers, enclosing many heads of the three-linked tapeworm of the dog. The bladder-worms may die and become caseous or calcified. Organs containing the parasites must be excised.

It is said that echinococci illness in human beings is rather common in Iceland and Northern Europe, where many dogs are kept.

Good sausages when cut across smell fresh. Bad sausages give off a smell of decomposition when boiling water is poured on the sausage-meat, and if lime-water is added the decomposing smell is more pronounced. A skewer pushed into *good bacon* should smell sweet and without taint on withdrawal. *Good pork* is pale, whitish in colour, and marbled with layers of fat. It is firm and elastic, and smooth and silky to the feel, and should be moist and the fat greasy, white in colour, and free from bloodstains. *Decomposition in meat* is detected by pushing a clean skewer up near the bone and smelling it on withdrawal.

Swine Fever.—A disease widely prevalent in this country, and may be acute, subacute, or chronic. It is due to filterable virus, often associated with two bacilli —viz., *suipestifer* and *suisepticus*. Swine attacked show inflammation or necrotic patches on the mucous membrane of the bowel and severe inflammation of the skin, often seen at the ears and under the abdomen. The diffuse inflammation is usually encountered in the small intestine, and the ulcers, raised portion of bowel, called "buttons," or necrotic patches, in the large bowel, generally at or about the ileo-cæcal valve, and in less number between that cap and the anus.

It is a notifiable disease. The flesh in the early stages might be used, but digestive disturbances may render the subject emaciated, and the meat innutritious, whilst the absorption of toxins from the bowel may cause poisonous carcass flesh.

In Germany, when the pig is emaciated and substantial changes occur in the carcass, such as discoloration, soddenness, and hæmorrhages, the flesh is unfit for human use. In other less severe cases, where the flesh is cooked, steamed, or pickled, according to regulations laid down in the sanitary police law, it may be consumed by man.

Where the carcass of a swine-fever affected pig is found in a slaughterhouse within town or city confines, where no burial-ground is handy, it is perhaps best to cut it up and boil it, then send it away to be buried or have it burnt in a destructor.

Swine erysipelas is not considered to be very common in this country, but probably more of it exists than is supposed. It may assume a virulent form and cause rapid death. It is due to a bacillus (*Bacillus erysipelatus suis*), which sets up a septicæmia, characterized externally by widespread livid spots on the skin, often of a quadrangular shape. The cuticle may be simply reddened, inflamed, or have black necrotic patches in it.

The mucous membrane of the stomach and small intestine may be swollen and reddened; the spleen slightly swollen and full of blood; the liver and kidneys show cloudy swelling, and the latter punctiform hæmorrhages on their external surfaces. The skin may be œdematous and infiltrated, and hæmorrhagic spots be present on the serous membranes. Often there is dropsical fluid round the heart or warty growths on the valves (see Fig. 58).

Plate XVII.

Fig. 56.—Swine Fever, or Hog Cholera: Large Intestine with Small Lentil-sized Ulcers (*a*). (After Ostertag.)

Plate XVIII.

FIG. 57.—LARGE INTESTINE WITH NUMEROUS SEVERE CHANGES DUE TO SWINE FEVER. (After Ostertag.)

The flesh of a pig dying of swine erysipelas does not communicate disease to man, but it is generally unmarketable, the organism having played havoc with the tissues, making the flesh watery and flabby.

A mild form of erysipelas, misnamed nettle-rash, sometimes occurs characterized by skin rash of four-cornered spots. These do not become hard, but are raised and dark red in colour. In a pig slightly affected the spots become accentuated after slaughter, but the internal organs will be found to be sound (Fig. 59).

Tuberculosis is rather frequent in swine. It is a disease due to the tubercle bacillus, communicable to man and other animals, being declared in an affected subject by cheesy, chalky, or purulent collections in the organs of the animal body and their corresponding lymphatic glands. The germs of tuberculosis are generally taken up by the food of swine, and the digestive organs are frequently affected, tuberculous nodules being found in the intestines, mesenteric glands, liver, and spleen. Occasionally infection through the air-passages happens. Tuberculosis of the bones (ribs and vertebræ especially) and joints occurs. The submaxillary, pharyngeal, and neck glands, and lungs, may be invaded. When a part becomes affected with tuberculosis, the disease may be limited to that organ, or be spread through the body by swallowing the bacilli, and by the lymph and blood stream. By coughing and swallowing the sputa the pharyngeal and mesenteric glands become involved, and from the mesentery, by means of the portal vein, the liver and its lymphatic glands are attacked. If the blood contains the bacilli, the muscles, kidneys, and spleen will be tuberculous, and what is known as fresh-blood infection will have occurred. All affected organs should be condemned,

and not given to other animals; and if great emaciation and generalization has not taken place, possibly the flesh may be passed.

Numerous small nodules, of about the size of a millet-seed, in any organ point to generalized tuberculosis. Emaciation of the body is a frequent accompaniment of the disease.

In order to see whether a carcass is tuberculous or not the lymphatic glands (see Fig. 48) of the lungs, pharynx, neck, mesentery, and those at the entrance to the liver, near the pancreas, should be examined. Where nodules are found in the muscles or course of the great blood stream, or where they have degenerated into softened masses, with uneven walls and thick or thin fluid contents, blood infection will have taken place, and the carcass should be condemned. Organs appearing healthy, but with tuberculous lymphatic glands, are unfit for consumption. In a frozen carcass of foreign meat if the pleura has been stripped, or the head and lymphatic glands removed, the carcass should be condemned.

The Royal Commission in 1898 came to the conclusion that, "In view of the greater tendency to the generalization of tuberculosis in the pig, we consider that the presence of tubercular deposit in any degree should involve seizure of the whole carcass and organs."

Anthrax is an infectious disease due to anthrax bacilli in the blood, occurring in all domesticated animals, and transmissible to man. It is a notifiable disease.

Appearances of Anthraxed Flesh in Swine.—Dark, tarry blood; watery, blood-soaked tissues, pale yellow to purple in colour in the region of the neck and pharynx; enlargement of the spleen, liver, and lymphatic glands; congestion of the intestines and mesentery.

Plate XIX.

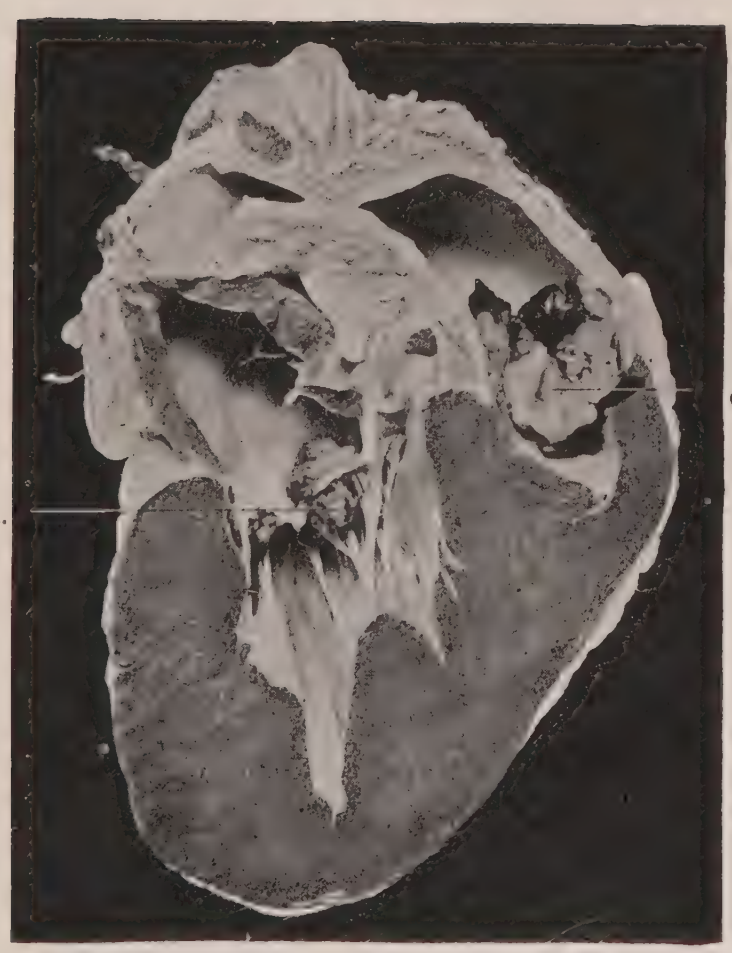


FIG. 58.—HEART WITH GROWTH ON VALVES DUE TO ERYSIPELAS.
(After Ostertag.)

Plate XX.

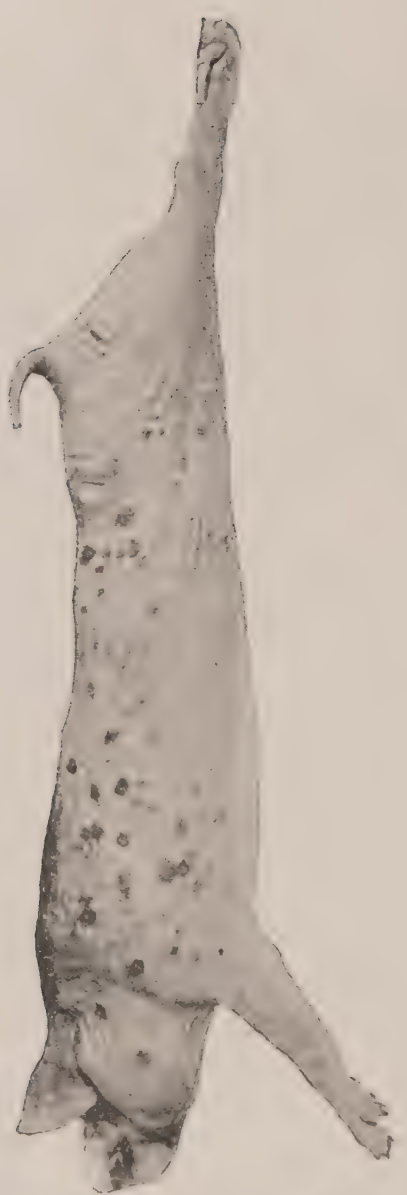


Fig. 59.—Mild Form of Erysipelas: Pig with "Nettle-rash." (From a photograph by Kabitz.) (After Ostertag.)

Foot-and-mouth disease is due to a virus, which causes blebs or vesicles on the snout, in the mouth, and on the feet. In swine the disease generally commences at the feet, often at the small claws, and then the snout becomes affected. The flesh is not harmful, but the parts with vesicles on should be burnt, and all pigs in contact soon slaughtered. This complaint may, however, be complicated with other illnesses, such as septicæmia, necessitating condemnation of the carcass. Pigs affected with foot-and-mouth disease would only reach the slaughter-house by chance. The disease is notifiable, and the Board of Agriculture regulations deal with it.

Swine-pox is not very common here. It is characterized by running of tears from the eyes and vesico-pustular spots on the skin. It may last among pigs for ten to twenty days, and cause a mortality rate of 25 per cent. Hæmorrhagic congestions may occur in all the viscera, and so the carcass be rendered unmarketable.

In any of the diseases coming under the Contagious Diseases (Animals) Act, by which swine for slaughter and which have been killed are affected, the disease should be notified and all precautions adopted. Anthrax, foot-and-mouth disease, swine fever, are all notifiable diseases, and tuberculosis ought to be. Isolation of a diseased animal suggests itself as a precautionary measure. If such a subject has been killed, opened, and examined, hands, arms, clothing, and boots of the operator need cleansing and disinfecting before other animals are visited or touched. People cutting up anthraxed carcasses with wounds on their hands should seek medical advice as soon as possible thereafter. The destruction of a dangerous carcass is best accomplished in an incinerator. Such a convenience ought to be handy for all public

slaughterhouses and abattoirs. Messrs. Manlove and Alliott supply one, as illustrated, for small animals. The heat in boiling is not sufficient to destroy all the harmful parts of meat. Steam under pressure is fairly satisfactory, as thereby meat may be heated to 100° C. in all parts.

Skin complaints, such as ringworm, scab, nettle-rash, occur in swine fairly frequently. The skin may also show bruises from blows or redness from the heat of the sun. Little roundish, bluish nodes also arise, about the size of a hailstone, with rolled-up hair inside them. Purulent and sero-purulent swellings are also common. Scab in swine is denoted by elevated spots, from the size of a grain of sand to a hazel-nut, in the white parts of the skin, which frequently give rise to sores. The carcass may be poor, badly nourished, and flesh flabby.

Actinomycosis (due to the ray fungus, *Streptothrix actinomyces*) of the udder of the sow is rather rare. The vessel affected with the disease becomes hard and very much enlarged, pressing out the gland and shortening the teat. The swelling is of tough, lardaceous consistence, and may contain large or small abscesses, filled with greenish-yellow pus. There may be little discharging holes in the swelling, and the elbow and belly-wall be also affected. Purulent abscesses may also form at the back of the throat, under the skin, or round about the vertebræ. The formation of pus in actinomycosis of swine is common. The tongue, brain, bones, and lymphatic glands may be the seats of disease. All diseased parts must be cut out and discarded, and the carcass condemned if the complaint is at all general.

Rabies.—A pig bitten by a mad dog may become rabid. The animal will show great restlessness, grunt

Plate XXI.

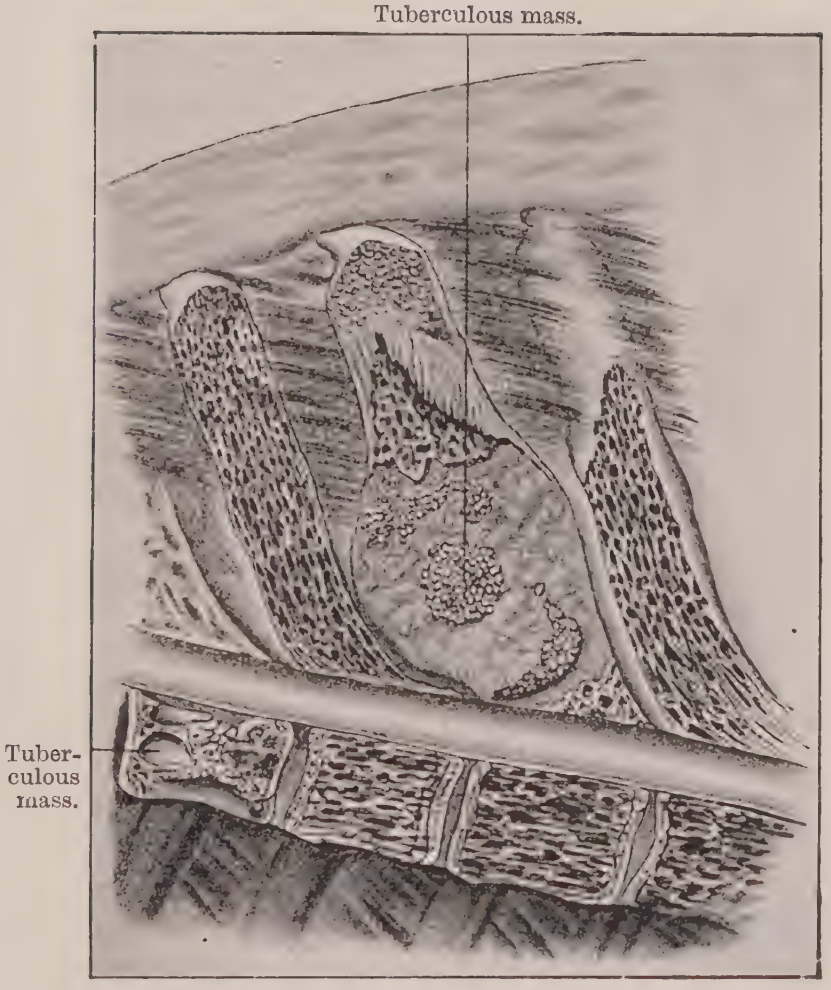


Fig. 60.—Tuberculosis of the Vertebræ in a Pig.
(After Ostertag.)

Plate XXII.

Fig. 61.—Swine Pox (Archivá Veterinara.)

Plate XXIII.

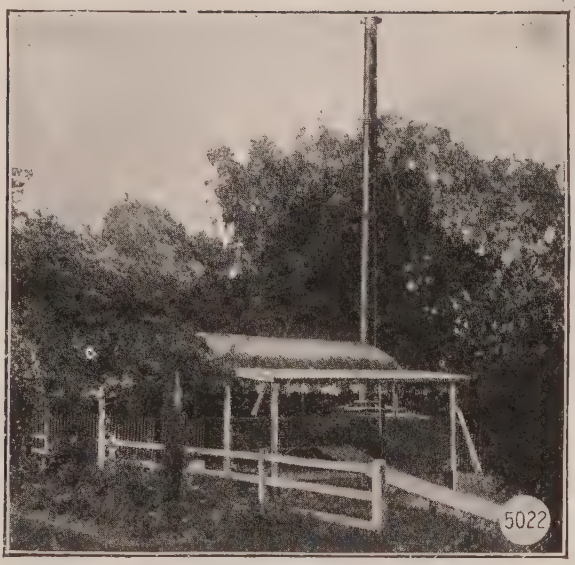


Fig. 62.—Destructor for Small Animals.
(Messrs. Manlove and Alliott, Nottingham.)

Fig. 63. Destructor for Small Animals.
(Messrs. Manlove and Alliott, Nottingham.)

about with a changed voice, bite, and be savage. The illness lasts three to seven days, and no great changes will be found in the flesh.

Smothered Pig.—Pigs now and then become suffocated. The carcass in this case will be purple or dark red in colour, the muscles will easily separate from the bones, and be soft and sticky to the touch. The serous membranes will be bloodstained, veins distended, and full of blood. The meat sets badly, smells offensively, and liver, lungs, and kidneys may be full of blood, and abdominal walls greenish in colour. The meat is unfit for food.

Pneumonia (inflammation of the lungs) in which the bronchi and alveoli are filled with inflammatory exudate and the tissue hepatized, is usually accompanied by a bad carcass, the flesh being fevered or flaccid and sodden.

Pneumonia (*Schweineseuche*) does not occur often here. It is characterized by inflammation and hepatization of the lung, or by greyish-white, dry, sharply circumscribed or purulent masses, with the lymphatic glands and root of the lung swollen, softened, and reddened. The pleuræ are the seats of fibrinous inflammation. This is a contagious lung disease.

The carcass should be condemned.

A simple fracture of a limb, if the animal is soon slaughtered and the tissues about the point of fracture discarded, should not affect the fitness of the flesh for human consumption.

Connective-tissue growths, if not purulent, or containing evil-smelling material or pus, do not necessitate condemnation of the flesh, but in local ailments all diseased parts should be excised. Widespread skin inflammation will probably render the carcass unmarketable.

XV

PORK AND BACON—SLAUGHTERING AND CURING

Roast and boiled pork, greens, and apple-sauce, have formed the diet of the various classes of society of many lands for long years. Tenant farmers, farm labourers, artisans, have all done good justice to their dinner and work on such food. The fresh flesh of the pig, as leg, griskin, chop, or cutlet, is toothsome, nutritive, economical. To the out-of-doors man and the physical worker what matter if the meat fibre is not so easily digested as that of beef or mutton, or the fat a trifle plentiful and rich? The city and town dweller, who is apt to have the changes eternally rung on him in beef, mutton, and stews—stews, mutton, and beef, will risk and enjoy a welcome change with a piece of young and juicy pork. Pigs' feet or trotters, and tripe and onions, too, have their votaries.

The choice of a good, fresh joint needs discrimination. The outer skin clean and elastic, meat fine and close-grained, of a clear pinkish-white and delicately-veined, without an overplus of fat, and the last-named firm, cool, fine, and white, will be found of good quality. All the blood will be drained away, and not visible in the joint when cut, if killing of the pig, bleeding and draining of the carcass have been properly performed. Each side of a porker intended for early consumption is generally cut up into six parts, three of which go to a fore and three to a hind quarter. These six portions are hind-

legs, the belly-piece, the hind-loin, the head and cheek, what is called the hand, and the fore-quarter. Nine of the first ribs go with the fore-quarter, the remainder with the hind. The production of a good carcass necessitates the pig being fasted, with a fair amount of water to drink, before slaughter.

Slaughtering is carried out by striking on the head with a hammer and cutting the throat, or by sticking only. The latter operation, done in the middle line without injuring either shoulder, and severing the artery without touching the heart, is quickly and neatly performed by the skilled operator; all the blood is then pumped and pressed out of the carcass, the fluid being caught for the manufacture of black puddings, etc. Then come scalding and singeing, which clean the skin and harden the rind. In Wiltshire and a few other places singeing only is the procedure. Scalding and scraping remove the hair and make the skin clean and white, the proper temperature of the water used being from 180° to 185° F.

Hanging up the carcass follows, the suspension being effected by a piece of notched wood, called a gambrel, inserted under the tendons beneath the hocks, and attached by a rope to a pulley or hook. The pig is then opened by removing a strip of the belly-piece, the whole of the inside removed, the interior cleansed with cold water, and the mouth (to allow of complete evacuation of blood) and sides propped open to permit of free circulation of air round the flesh and to cool it. The chilling of a cadaver is important; it must be left until cold and set, which will occupy longer time in warm than cold weather. A temperature of about 38° F. is the best one to effect proper chilling. Much

pork is *pickled and cured*. The object of this is to lay up a store of victuals for future use, to preserve meat, and prevent decay and putrefaction therein. Dryness, as in smoking, and brining or salting, as in pickling or curing, prevent the germ growth which makes meat putrescent. Soaking in brine or pickling depends for its efficacy on the principle of osmosis, which process is seen when liquids diffuse through membranes: what is outside passes into the tissue, and the animal juices inside are drawn out. Brine passes thoroughly into the meat, and is aided and expedited in some large establishments by being injected with a syringe into punctures in the flesh, or by the meat pores having been previously exhausted of air under vacuum pressure. Meat should only be salted when cold, but the sooner this is done after the warmth is out of it the better; it must not get stale, otherwise it will not take up the brine properly. There are many recipes for pickling. A good one often used in large establishments is made in the following proportions:

Salt, 27½ lbs.; saltpetre, boracic acid, or sodium sulphite, sugar, of each 2½ lbs.; water, 65 lbs., or 6½ gals. The sugar should be left out in warm weather.

Another one, sufficient for 500 lbs. of meat, is: Clean rain-water, 20 gals.; fine dairy salt, 50 lbs.; brown sugar, 5 lbs.; saltpetre, 2 lbs.; allspice, ½ lb. Dissolve the salt, sugar, and saltpetre in the water. Immerse the allspice tied up in a calico bag. Boil for an hour, skimming off the frothy matter rising to the surface. Allow to cool before filling the pickling utensil.

One that may be used at home consists of: 8 lbs. of coarse salt, 2 lbs. of brown sugar, 1 quart of treacle, 2 ozs. of saltpetre, and 4 gals. of water. This is the quantity for each 100 lbs. of meat. In warm weather

2 ozs. each more of saltpetre and salt may be used. The pickle to be dissolved and poured over the pork; boiling the mixture before use is advisable in warm weather. A 3 or 4 lb. piece of pork may be pickled at home by dissolving 1 lb. of salt and ½ oz. of saltpetre in a gallon of water, putting the meat in for four days, when it may be taken out and boiled, or, if desired, left in the brine for ten days, hung up, and dried. The pickle must entirely cover the meat, whether in barrel or jar, hence a weight is frequently placed on the cuts to keep them down under the mixture, and a cover is lightly placed over the top.

If pork has a large consumption, what can be written about bacon? Throughout our country it is ever on the breakfast-table, and almost as much used and necessary as "the staff of life."

Good bacon should have white fat and bright red lean, and small hams are perhaps more to be preferred than large ones. The sweetness of the latter may be tested by running a knife blade up near the bone and smelling it when withdrawn; if of a pleasant odour, the ham is good, whilst if greasy and bad-smelling, the joint is bad. The best temperature for bacon-curing is a moist one of from 40° to 42° F. Flitches are put rind downwards in troughs, the bottoms of which are sprinkled with a layer of salt; the meaty side is then rubbed with salt and fine saltpetre (the latter in the right proportion, 2 to 4 ozs. in all for each side, according to its size); a thick layer of salt is then put on top of the flitch, so that each side forms a big shallow dish, storing the preserving products. One flitch, rind downwards, is placed on top of the other, and the hams, rubbed with the salt mixture and covered with the brine, are placed

on top of the flitches. Bones need rubbing with fine saltpetre, both in hams and flitches; there is a tendency for the meat in their neighbourhood to be imperfectly cured and the joint spoiled. The flitches may be turned about every three days, and in places where the salt has liquefied fresh brine be put in. Some leave the sides undisturbed for ten or a dozen days, and then reverse them.

This is a good recipe for *dry curing*: Fine dairy salt, 50 lbs.; brown sugar, 5 lbs.; saltpetre, 2 lbs. Mix well. Rub in over the flesh and around bones and joints for three or four days. Afterwards spread the mixture freely each day. Change the sides each day, so that the one on top one day is at the bottom the next. Requires about fourteen days, if smoked afterwards.

A good French recipe is: Fine salt, 6 lbs.; brown sugar, 6 lbs.; allspice, 1 lb.; mustard, 1 lb.; saltpetre, 1 oz. Mix well. Rub in for three days, and afterwards spread mixture freely for seventeen days; dry in smoke. After a fortnight to three weeks the meat is taken out to drain, and hung up in a dry atmosphere for two months.

According to how long the meat is to be kept, and to prevalent taste, different kinds of cure are recognized.

For immediate use, 1 lb. of meat may be cured in a day; a mild cure of 14 lbs. in fifteen days; and for keeping, or strong cured, twenty-one to thirty days.

Smoking Bacon acts as a preservative by bringing about dryness and driving off moisture, which favours germ production. After curing mildly, trimming, and dusting with pease meal, bacon is smoked at a temperature of 85° F., the smoke being usually produced from wheat and barley straw and hard wood (such as oak) sawdust. Some curing by smoke is done in the

chimneys at home. The celebrated Hamburg hams are hung in the chimney to smoke for about six weeks, and afterwards subjected to the vapours from juniper wood. Hams are, however, usually best smoked in specially constructed smoke-rooms or stoves, where they may remain from three to thirty days longer. In deciding the length of time to apply smoke, notice must be taken of the colour of the meat, which should be of a light brown. Smoke must be cool when coming in contact with the bacon, and moderate smoking for a length of time is preferable to a short profuse exhalating.

A well-constructed smoke-house is about 12 feet high, with an earthen, brick, or cement floor, with a cavity in the centre away from the walls, so that the fire will not burn them. The bacon is suspended 6 to 10 feet from the floor. The column of smoke may be cooled and directed round the bacon by a galvanized iron sheet placed a few feet above the fire.

The fat of the pig, or leaf, from which *lard* is made, is hung up to cool as soon as it is taken from the carcass, and adjusted so that the air can get round it. It is then melted down, clarified, and cooled. The waste products left after the liquid fat is drawn off are used for manure. Great heat, up to 620° F., is necessary in the manufacture of glycerine from lard. At this temperature the glycerine is separable from the other fats.

XVI

DISEASES AND AILMENTS

The pig is not an easy animal to dose with medicine, and drugs are best given mixed up with honey, treacle, or glycerine to form an electuary or paste and smeared on the lips and teeth. Remedies made tasty or tasteless may also be mixed with sloppy food and in powder form, and where skim milk can be procured they are often taken readily enough. Occasionally an old boot with the toe cut off may be put in the pig's mouth and the medicine poured into it, and to control the pig a noosed rope is slipped over the upper jaw and tightened behind the tusks. Skim milk is a valuable diet for sick pigs, as are also oat-meal or barley-meal gruel; and linseed mucilage is useful as a laxative and in cases of sore throat or lung trouble. All troughs for ailing pigs must be kept scrupulously sweet and clean, and, in the maintenance of health, exercise, a grass run, and clean sties play a very important part. To obtain the proper action of purgatives in pigs it is desirable that solid food be withheld from them for twenty-four hours, and sloppy diet or wash given to them. Sodium sulphate is nicer in its action and easier given to pigs than oil, which nauseates and upsets the digestive organs. The dose of the sulphate is 6 to 12 drachms according to age and size of pigs.

Abortion.—The casting of the young already dead or before they are capable of maintaining a separate existence is known as abortion. In swine it may happen at

the beginning of the second, third, or fourth month of pregnancy. It is a disease which, once occurring, is rather liable to recur, and mother animals subject to it are best discarded as breeders.

Animals badly fed, not having sufficient exercise, too fat while pregnant, eating unsuitable, spoilt, or indigestible food, or too closely bred, may abort. Quick driving, chasing, rough handlings or happenings during railway journeys in sows advanced in pregnancy, cause untimely voiding of the young. Blows, jumping up or down when heavy-bellied, spicy, salty, or soapy wash, may occasion the accident. Abortion occurs, too, in countries where sows are fed on rye, in which ergot exists as a parasite.

The more serious *infectious abortion* has been recorded as occasionally occurring in large piggeries, and if such arises, veterinary help must be obtained, and all stringent measures to check the spread of the disease be adopted.

The young may be cast without much pain, or all the symptoms of labour may be present. Isolate the dam, keep her quiet, and provide plenty of clean litter for her, She will take much time to recuperate and regain her strength after the accident, and it is best to fatten her.

Premature birth, or where small, not fully developed youngsters are born before full time, is an unprofitable occurrence. In the warm time of the year the weaklings may be persuaded to live if care is exercised, and some artificial feeding (see p. 67) resorted to. In cold periods of the year most of the unfortunates die.

Measures against the mishap comprise avoidance of the causes of it; efficient care and treatment of the dam prevent it. Occasionally the sow shows warning signs —such as loss of, or depraved, appetite, constipation,

swelling of the shape, etc. These indicate the adoption of preventive measures, such as sloppy, easily digested, warm food, and a dose of three or four tablespoonfuls of sodium sulphate.

Abscesses occur rather often in the pig. They are most frequently due to blows or injuries, and often contain blood and serum. When arising in the neighbourhood of the teats or abdomen, they must be distinguished from tumours and hernia. When fluctuating, soft, and superficial, they may be opened and syringed out with antiseptic, and dressed or plugged with lint soaked in carbolized oil. When deep-seated, they must be well fomented with hot water and dressed with stimulating liniment until they come to a head (see also Pyobacillosis).

Actinomycosis is due to an organism called *Streptothrix actinomyces*, a ray-shaped fungus living outside the animal body on grasses and cereals. A sow having a sore or breach on her abdomen, and lying on the material harbouring the germs, gets infected through the sore, wound, or abrasion. The symptoms of the complaint have been described in a previous chapter. When diagnosed, slaughtering the affected animal is the quickest and best way to deal with it.

Anthrax is a specific contagious disease, communicable to man, horses, cattle, sheep, etc., and due to the organism known as the *Bacillus anthracis*. The bacilli grow rapidly in the blood, causing all the appearances of a virulent septicæmia. They may gain entrance through breaches in the skin, mouth, throat, or by the digestive tract. Swine are generally affected by eating the flesh or taking up blood or discharge-soiled matter of an animal that has died or been mistakenly slaughtered whilst suffering from the disease. The liability of the

discharges from a diseased carcass, or the blood from a slaughtered beast coming in contact with pasture food or litter, is considerable, and this method of infection must not be lost sight of as regards swine. Foreign cake, feeding-stuffs, and artificial manure may also contain the germs of the disease. Death is generally the result of an attack of anthrax in all animals.

The importance of preventing the germs and their offspring (called spores) from spreading cannot be overestimated.

Plug all the natural openings (mouth, anus, vagina) of a dead animal body with tow or other material soaked in a strong disinfectant. If the carcass has to be moved some distance from the pasture, straw-yard, or sty for burial or cremation, it will be best taken in or on something that will prevent fluid discharges from the cadaver dropping on litter, food, or pasture. All earth or manure soiled by matter containing anthrax bacilli may be limed or soaked with a 5 per cent. solution of formalin. The ground where a carcass has lain may be dug up, sprinkled with lime or formalin solution, and resurfaced. If any delay occurs in dealing with the place, it should be fenced or railed off until it can be attended to.

The symptoms of the disease in the pig are fever, inflammation of the pharynx, with great swelling of the throat and gullet. The œdema may extend from the neck to the face and eyes, and as it spreads cause choking and difficulty in breathing. Bluish-red spots appear on the skin, the visible mucous membranes become blue (cyanotic), diarrhœa arises, and in a few hours or one to two days the pig dies from suffocation. Now and again blebs or vesicles filled with bloody fluid may be seen on the tongue, cheeks, and lips.

Prevention.—The disease is notifiable. Sudden death, with a swelled throat, indicates what ought to be done. On no account must the carcass be cut open or incised. The blood swarms with the organisms, and, once exposed to the air, the bacilli form spores (sporulate) rapidly. Flies may spread the disease. Death of pigs out at pasture from anthrax suggests removal of any grazing cattle thereon. Similarly, the suspicious demise of cattle indicates shifting the pigs. All droppings and litter in the sty must be burnt, walls scraped, and these, as well as the floor and furnishing, washed with hot water and disinfectant, sty left empty for a week, and parts suitable limewashed. Drains must not be forgotten in the germicide overhauling.

Apoplexy.—Liable to attack young animals in the fat state when rich food is given incautiously and injudiciously. Change from farinaceous to much animal food, or too quick forcing with strong nutriment, brings it on. Liver, kidney, and heart disease may occasion the symptoms of the sudden attack.

If congestion of the cerebral vessels only exists, a sharp purgative may relieve the trouble; but a satisfactory dose is difficult to get into a pig lying comatose and as inert as a log. Two or three drops of croton-oil perhaps produce the best result. Where hæmorrhage or effusion on the brain has taken place, death occurs. Cutting the animal's throat is the most economical procedure.

Catarrh is associated with a discharge from the nose, and frequently with a cough. Snuffles in pigs is pretty well known, and soon spreads in a litter.

Causes.—It is usually due to east winds, chills, cold, damp sties, draughts, wet and foggy weather. Small,

well-bred pigs soon catch cold if not properly housed. The parts affected are usually the throat and nose, but the disease may spread to the bronchial tubes and lung tissue. Discharge from the nose and snuffling are generally present. There may be a cough. Where there is great difficulty in breathing mustard may be put on the throat and sides, and a dose of fever medicine given in warm liquid nourishment. Provide warm, dry litter and housing. If the disease occurs among a lot of pigs, separate the affected from those that seem well; keep all of them warm and dry, giving lukewarm, sloppy, nutritious food. A powder composed of 1 part of sal ammoniac, 1½ parts of liquorice powder, and 2 parts of Glauber's salts—a teaspoonful three times daily to each animal—is often a very effective remedy.

Constipation, or Costiveness.—Occasioned by errors in feeding, often due to astringent diet, such as acorns, beech-nuts, or chestnuts, to insufficient supply of water, or dry, indigestible nutriment. The glands of the bowel may secrete little or no fluid to soften the contents of the intestinal tube, or the natural worm-like motion of the gut which passes on the food be weak and faulty. Tumours, constrictions, or organic malformation may exist and cause the trouble. Sows before and after parturition are often costive, and need an oleaginous aperient.

Treatment.—Sloppy, fluid diet. A dose of salts and sulphur (2 tablespoonfuls of each to a fair-sized pig) or sodium sulphate, will help to remedy the disorder. Enemas of soap and water also do good. Green food and roots make the fæces soft and easily voided.

Diarrhœa.—The evacuation of loose, semi-fluid fæces is often seen in sucklings. The youngsters show dis-

inclination to suck, lose their bloom, walk about with drooping ears and arched back. The dung, at first hard, soon becomes thinnish, yellow, and bad-smelling.

The causes are to be found in the mother's milk (unsuitable, strong nourishment has made the composition of the lacteal fluid too rich, or bad and decaying food may have been given her, temporarily upsetting her and her milk-supply); in cold, damp sties and litter having chilled the youngsters; in faulty feeding of weaners; bad smells, dirt, and uncleanliness about the abode. When the disease occurs, great cleanliness in and about the sty helps to check it. Milk diet must be avoided for mother and weaners, especially if sour. Crushed dry corn and water to the sow helps to set her milk right. If the pigs are eating, a teaspoonful of prepared chalk mixed up with the yolk of an egg, or a little powdered charcoal, may be given. Youngsters affected may be treated with a small quantity of well-boiled flour or arrowroot gruel, and ½ dram doses of subnitrate of bismuth and sodium sulpho-carbolate may be given, or 7 to 15 drops of chlorodyne on the tongue.

At times scour sets in as an infectious complaint. When this occurs, great cleanliness in and about the abode, good ventilation, warm, dry litter, and sound corn food are indicated. Syringing out the womb of a recently-pigged sow where diarrhœa occurs in a litter is good practice. A dam coming on heat when the little ones are sucking may give her brood diarrhœa. One recent case of scour in a litter was traceable to some dead rats under the flooring of the sty. The stench from the defunct vermin under the wood floor upset the sow's milk, and all the youngsters fell ill of the scour. The mud from pond bottoms or ditches in which leaves have

collected put on the sty floor is said by some authorities to check diarrhœa in pigs. There is no doubt that clean, sweet, dry earth put on some sty floors renders the abode less offensive. Where diarrhœa goes on to *dysentery*, and the looseness of the bowels becomes chronic, a good prescription to use is ½ to 1 teaspoonful three or four times daily of the following powder: bismuth subnitrate, 1 ounce; sodium sulpho-carbolate, 1 ounce; sodium bicarbonate, 2 ounces. Mix.

Eczema is a vesicular disease of the skin, occurring most frequently among young, badly-cared-for swine living in dirty sties. On the thighs, sides, belly, and eyelids the blisters may appear; they burst, and a little red fluid is discharged, and dark brown or black scabs form. The weakly animals suffer the most, but with appropriate treatment the majority of them recover. The disease may be mistaken for swine-pox.

Suckers two to five days old may be affected with an infectious eczema of a rather severe form, the disease spreading to other litters, and the teats of the mother becoming affected. An eczematous disease of young pigs is called *soot* or *pitch scab*, and may appear on the inside of the thighs or forelegs and along the belly and sides. As its name denotes, it is characterized by darkish or blackish scabs. A little sulphur and magnesia (a teaspoonful of the former and a tablespoonful of the latter) may be given in the food, which should be laxative and non-heating where the pigs are fat, and more nourishing if they be poor. Washing the dirty skin with antiseptic soap and warm water or a weak solution of creolin, dressing with sulphur and zinc ointment, will usually get rid of the complaint, if the pigs are suitably fed and cleanliness adopted in their management.

Avoid strong, overheating food (too much maize or potatoes).

Epilepsy, like apoplexy, is a nervous disease, but here the coverings of the brain are usually affected. It differs in the signs shown, in that in the former the animal falls, may froth at the mouth, and the limbs jerk convulsively, whilst in the latter dropping, keeping still, loud, heavy breathing, tongue out and blackish, are prominent symptoms. True epilepsy is said to occur very seldom in the domesticated animals. It is usually of a reflex or secondary nature in them.

The causes may be tubercles, tumours, or parasites (cysticerci) on the brain. Foreign bodies in the stomach, disease of the kidneys, or worms in the intestines, may occasion it.

Treatment will resolve itself into finding out the cause of the attack. As a routine measure a dose of Epsom salts may be given, whilst, if worms are suspected, santonin and male shield-fern oil, given in skim milk, are proper remedies. Sometimes a course of sodium bromide does good. A bottle of this medicine may be made up containing 2 drachms to 1 ounce of the bromide (according to age and size of the pig) in 8 ounces of water, and two tablespoonfuls be given in sloppy food two or three times daily. For the relief of a sudden attack the pig may be immersed in warm water or have cold water dashed on its head.

Gastritis, or inflammation of the stomach, is generally due to irritation of the organ, or poisonous matter (bad flesh, mineral or vegetable poisons) taken up. The intestinal tract of the porcine species is, perhaps, liable to more disease than that of any other animal. If the existing feeding conditions for profitable operations be

considered, and the liability of the food to become infected or contaminated remembered, it cannot be a matter of surprise that this is so. Piggy has to stand much forcing nowadays, and digestive organs get great work. Poisonous or indigestible food may be picked up in the rambles. Many bowel diseases are caused by bacilli. Our friend takes them up from the floor of a dirty sty with his feet, then puts his pedal extremities in the trough, and so infects his food.

The common non-bacillary causes of gastritis are overfeeding, spicy, briny or soda-solutioned wash, indigestible, husky, fibrous food, and foreign bodies in the stomach. Germinating potatoes cause a severe form of gastritis.

Gruel (oat-meal or flour), bicarbonate of soda and bismuth, in a little milk, may be given. The animal will be thirsty, and probably take up medicine well in the liquid nourishment. A milk diet is of special value in potato poisoning.

Lice occur in badly housed and kept pigs, especially in wooden sties, dark, damp, and dirty. The name of the parasite that affects pigs is *Hæmatopinus urius*, which is the largest of the louse tribe. They cause their hosts much discomfort by sucking the blood and producing great itching. Very young pigs when affected suffer badly, not sucking, and at times dying from unrest and discomfort if not attended to. Infected animals washed with 2 to 3 per cent. of creolin solution greatly benefit. The inside of the thighs of pigs, where the lice hang on the longest and are apt to be overlooked, is best dressed with a little sulphur and rape-oil. Where straw litter is not well kept, it may become lice-infested before use, and after cleansing the sty and pigs, it will be found that they get re-infected again through the litter.

The sty and surroundings will require cleansing and disinfecting. A recent Russian writer considered that he caused one outbreak of swine fever by transferring lice from diseased pigs to healthy ones.

Liver, Congestion of.—Congestion of the liver and a pot-bellied appearance, in which the liver and stomach are both implicated, is a rather frequent complaint in young pigs fed on too coarse or rich food, and not getting any vegetable diet or sufficient exercise. Wash with too many solids in it and poor quality sharps and middlings (mostly husk) are chief causes of this complaint, as is also too strong food at the commencement of weaning or too early use and too great quantities of potatoes. The remedy is to give a dose of calomel (3 to 30 grains per pig) or sodium sulphate (1 to 3 ounces). Exercise, light nutritious diet, and change of food are also indicated. **Jaundice** is indicated by a yellowish tinge of the eyes and mouth. Give a milk diet and a drachm to a drachm and a half of sulphate of soda daily for ten days or a fortnight. Avoid producing diarrhœa.

Mange, or Scabies, due to a parasite that burrows under the skin, called *Sarcoptes scabei*, is communicable to man, ox, and the goat (Hutyra and Marek). There is itching, scaling, and scabbing of the skin, seen inside the thighs, about the eyes, ears, rump, back, and sides. The scabs are greyish-white or brownish-black in colour. In bad cases the skin may become thickened, folded, with discharge between the furrows. The head, base of the ears, and around the eyes are usually regions badly affected. The detection of the parasite, the large area of skin covered, and the intense itching indicated by the animal constantly rubbing itself, will distinguish the disease from eczema or other skin complaint. The old-

fashioned mixture of rape-oil, sulphur, and oil of tar is a good application for this complaint.

To prevent reinfection, litter should be burnt, sty and surroundings cleansed and disinfected. Isolate any scabby animal early.

Mr. J. A. Griffiths, M.R.C.V.S., writing in the *Veterinary Record* for June 15, 1918, describes an outbreak in some pigs treated by him. He dressed the pigs with a mixture of 25 per cent. of sulphur and 2 per cent. of oil of tar with fish-oil as a base, and the following day they were scrubbed with soap and hot water containing sodium carbonate. The sulphur dressing was afterwards applied three times and the bath repeated at the end of a week, and the sulphur dressings continued at weekly intervals. It took six to eight weeks to cure the pigs. In this case the disease was introduced by a scabby boar, so that the importance of maintaining the perfect health of the lord of the harem cannot be too strongly impressed on pig breeders.

Measles (see previous chapter).—Unless a pig is badly affected with measles, external signs of the disease are not present. The cysts may be seen at times inside the eyelids or in the interior of the eye itself, at the edges of the tongue or underneath it or involving its ligaments. If present in large numbers, the tongue may become paralyzed. On the Continent the mouth of the subject is kept open with a sort of wooden peg, and the veterinary surgeon makes an examination of the tongue, and if finding little nodes from the size of a lentil to a pea, it is probable the animal is affected with measles. In some cases scars denote that the cysticerci have been cut out.

Necrotic Stomatitis.—Infectious sore mouth is seen in young pigs fed on filthy garbage and slops and kept in

foul conditions. The treatment resolves itself into following out the rules of hygiene and altering the food. Irrigate the mouth frequently with a 4 per cent. solution of potassium permanganate. and give teaspoonful doses of flowers of sulphur in the food. Skim milk and mucilaginous fluid in the diet aid recovery. Badly affected animals are best slaughtered

Necrobacillosis.—The bacillus of necrosis, besides causing sore mouth, may also affect the snout, the skin, or the vulva. Energetic disinfection of these parts and the giving of laxatives and intestinal antiseptics (sodium hyposulphate) is indicated. Clean out the sty and troughs, whitewash and disinfect.

Paralysis of the hind-quarters is most common in heavy hogs, especially when these suffer from constipation and indigestion. It is also seen in sows not having enough exercise and run down by nursing a large litter. It may be due to blows or falls or injury by a rough, heavy boar at serving time. It occasionally occurs in two or three members of a herd that have not been able to stand the constituents or same amount of food as given to the rest of their companions, and where the kidneys and bowels have become inactive. Prevention consists in giving a well-balanced ration and keeping watch over the pigs individually. On its appearance isolate the pig or pigs affected and put on dry, soft litter. Give 10 to 15 drops of tincture of nux vomica two or three times daily in sloppy food, or have an electuary made up containing 2 to 10 grains of nux vomica per pig as a dose. Pigs affected should be encouraged to walk by passing a broad bandage under their bellies and lifting them up and supporting them on each side. Stir them up at night to make them urinate, and rub the backbone and loins

with a good stimulating liniment. A purgative dose of sodium sulphate will do good, and, if rheumatism is suspected, a few doses of salicylate of soda.

Leg weariness or *going off their legs* may be mistaken for paralysis. Here the loins and legs may be rubbed with oils recommended under "Rheumatism." In all cases, as soon as the pig gains some use in the limbs, put it out to graze if the weather is suitable and if handy ground is available.

(1) **Pleurisy,** (2) **Bronchitis, and** (3) **Pneumonia,** due to colds, chills, and infection. Shivering, fever, coughing, laboured breathing, and disinclination to feed, are all associated with lung trouble. Dress the sides of the animal with mustard or strong liniment, and clothe with a strip of flannel. Give warm, sloppy food, milk with an egg or two beaten up in it, linseed-tea, or a little warm bran-mash. Potassium nitrate, sodium hyposulphite, and magnesium sulphate may be administered in the food. Isolate the subject in a warm, dry, well-littered sty, and let the veterinary surgeon see it, if a valuable one, or if he is handy.

Pyobacillosis or purulent infection of the pig occurs as a result of the action of *Bacillus pyogenes suis* on wounds or excoriations of the skin or infection of the navel. It is said to be more frequent in sties with cemented floors than in those with earth or wooden floors, the reason being that the skin gets chafed or abraded on the roughened cement floor, and these sores form ports of entry for the organism (Moussu). The younger the pigs the more easily infection seems to spread, and it may produce great losses among them. Abscesses form round the navel, or in older pigs about the jaws, flank, shoulder, hocks, etc. Treatment consists in isolation of the affected

pigs, evacuation and energetic injections of the abscess cavities with peroxide of hydrogen solution or sulphocarbolate of zinc (1 drachm to half pint of water). Persistent cleansing and injecting of the wounds and rigorous disinfection of the sties are indicated.

Rheumatism differs from cramp. Cramp is only a transient ailment, seen after long lying; rheumatism lasts for some time. It is indicated by lameness, which now appears in one limb and again in another; or the complaint may be of a serious kind, prostrating the subject, and causing heart and kidney trouble. Damp, cold, draughty sties occasion it. It may be seen in sows after pigging, when it is probably associated with uterine mischief; hence the dam's womb should be antiseptically injected. Articular rheumatism is rather common, and is indicated by swellings of the joints of the limbs.

Pigs lying up against an overwarm wall on one side of the sty, such as that of a bakehouse, suffer from rheumatism. The pig may be better one day, especially if the weather be dry and warm, than another. The joints swell and become painful. There is no doubt an hereditary tendency to this disease, and probably the offspring of old parents are most liable to it. A dose of Epsom salts, followed up by salicylate of soda (grs. xx.), three times daily, or aspirin, may be given.

Apply a soothing liniment (such as pure rape-oil 4 ounces, liquor plumbi subacet. 2 drachms, pot. carb. 1 drachm, water to 8 ounces) to the painful joints, and keep the pig warm, dry, and free from draughts and damp. A lotion of 3 drachms of subacetate of lead and 3 drachms of zinc sulphate to a pint of water may be applied to painful joints, and a good rubbing ointment is 2 drachms of ichthyol to 1 ounce of vaseline.

Rickets is a generalized disease of young animals, affecting the bones which are deficient in lime salts and bent or deformed. In the pig the bones of the limbs, vertebral column, face, or jaws may show evidence of the complaint. Lack of exercise in sunshine and the open air, of lime salts in the food, or sufficient nourishing quality in the victuals, are contributing causes. Rickety animals must not be bred from, as there is an hereditary tendency to the disease.

Treatment.—Two to six tablespoonfuls of powdered bone in the food, or 5 to 10 drops of liquid chloro-phosphate of lime three times daily. Stimulating liniment to the limbs.

Ringworm is due to a thread-like fungus affecting the skin, called *Trichophyton tonsurans.* It may occur and spread rapidly among swine, and be rather troublesome to get rid of. Separate healthy from affected pigs. Give cooling diet, and dress the skin with sulphur ointment or other antiparasitic mixture. Frequently limewash and disinfect the sty, paying especial attention to woodwork.

Sore feet may be due to long travelling, filthy sties, bruising from hard, rough, or frozen ground. Lameness will be present, and the feet will be sore and inflamed and the skin between the toes red and irritated. Turn the animals out on soft pasture and dress the feet with a mixture of equal parts of boracic and zinc ointment.

Spasm of the Diaphragm, commonly known as the *thumps,* which occasions jerking movements of the body, is rather common in young pigs. It is due to irritation of the nerve-supply to the midriff, occasioned by lack of exercise and overloading of the stomach or the drinking of water poisoned by chemicals (carbolic acid or bichloride of mercury.) The thumping movements are easily seen

and may also be heard, and are so violent as sometimes to sway the body to and fro. *The treatment* is light diet and plenty of exercise. Give a dose of sodium sulphate or calomel to clear out the bowels and thereafter 3 to 15 drops of tincture of opium (according to size and age of animal) in sloppy food.

Swine Fever, or **Hog Cholera,** is the most serious disease of pigs in this country. It is due to a small germ, that cannot be detected by the microscope or caught in the bacteriological filter. This filterable virus produces an acute, sub-acute, or chronic illness. Two bacilli, *suipestifer* and *suisepticus*, are also found associated with the lesions produced by this disease. It is prevalent all over the world wherever swine exists. There is no doubt that the difficulty occasioned in combating it is chiefly due to the highly infectious nature of the urine and dung of affected animals, and that the discharge from eyes and nose may spread the complaint. The virus, too, has marked vitality, and is not easily killed by heat or cold.

If the excreta of pigs could be as carefully disposed of as in the case of typhoid fever of the human subject, if infection could be checked in as complete and satisfactory a way, swine-fever ravages would cause much less loss. The natural habits of the pig—carrying infection by the feet to the trough, and soiling his mouth and snout with the moisture of the sty—the lack of knowledge of adequate disinfection and ordinary cleanliness of many pig-keepers, the faulty construction of sties and drains, the non-reporting of mild cases of the complaint, the difficulty of promptly isolating and slaughtering affected subjects, all tend to keep the disease alive. Trade, traffic dealers, castrators, dogs, and rats spread it, and, like the

poor, the author thinks it will be always with us. Education of the laity may help, however, to limit its destructive character or prevent it arising. The man who breeds and feeds his own pigs is safer from swine fever than the one who buys at market. The subacute and chronic cases, where a porcine may harbour the germs for some time, probably during its life (like the American cook), and be a spreader of them, will always occasion almost insurmountable difficulties in checking the spread of the disease; but a recognition of the fact that such a state may exist will do good.

The symptoms of the disease usually occur in from one to ten days. There is a rise of temperature, the animals do not come to their food, or eat only indifferently, have arched backs and downcast looks. Redness, followed by marked reddish to bluish-brown or purple spots, appear on the ears and under the abdomen. The rash may be in patches or spread over the whole body. Constipation, present at first, soon gives way to diarrhœa. There may be discharge from the eyes and nose and a rattling cough. When complicated with lung trouble, death soon occurs. The mesenteric and lymphatic glands are much inflamed. The mucous membrane of the stomach may be thickened and abraded, or, in chronic cases, ulcerated. In acute cases the intestines are seen to be intensely inflamed, or even infiltrated with blood (hæmorrhagic). Ulceration is usually the state found in the chronic type, and there may be great swelling and thickening of the lining of the intestine at these spots, forming what have been not inaptly described as "buttons." The kidneys will have hæmorrhagic patches on them.

Serum Treatment is gradually coming to the front

here as a preventive in the treatment of this disease. The Ministry of Agriculture and Fisheries, through their Veterinary Inspector, will, if the owner of the pigs consents, treat all of them with the injection of serum. This treatment will protect the pigs not affected from any damaging attacks of the disease for ten days. It renders injected pigs liable to a mild attack only, if they contract the disease." If serum is used it enables owners of pigs to restock their premises earlier than where it is not used. In order to obtain the best results from serum treatment, notification of suspected outbreaks of swine fever should be made at the earliest possible date by owners of pigs.*

Recently in Minnesota, U.S.A., 251 hogs in affected herds were vaccinated and 44 died. In these same stocks 68 out of 76 unvaccinated pigs died. Out of 210 hogs not yet exposed to infection, but vaccinated, 2 died; and after vaccination all these subjects were exposed to contact or experimental infection. In the healthy herds, where 201 animals were vaccinated, 9 healthy subjects were left untreated, all of which died.

The Minnesota Legislature considered that the results obtained in 1907-1909 by vaccination were so encouraging that they appropriated the sum of 10,000 dollars for a vaccine plant at the experiment station (Dr. M. H. Reynolds).

The Germans consider they have obtained good results in hindering the spread of this disease by inoculating pigs with defibrinated blood of an affected animal or a serum prepared from the same source. Immunity is said to last for six months, and can be conferred again by revaccination.

* Ministry of Agriculture and Fisheries Leaflet, "Swine Fever—Treatment by Serum Injection."

Sties should have a thorough cleansing, then be disinfected with hot soda solution, and whitewashed out with milk of lime, 1 in 4, to which crude carbolic acid has been added. Colonel Fred Smith, in his "Veterinary Hygiene," recommends 1 in 1,000 mercuric chloride solution, and 10 per cent. chloride of lime solution, as effective disinfectants in swine-fever cases.

The disease is notifiable, and burying operations are carried out under official supervision.

For post-mortem appearances, see Figs. 56 and 57.

It is sometimes possible to try and prevent swine fever from occurring in healthy pigs in close proximity to centres of infection. A powder largely used in this connection in America, and which has also been esteemed in one or two instances here, is made up as follows:

Wood charcoal	1 pound
Sulphur	1 „
Sodium chloride	2 pounds
„ bicarbonate	2 „
„ hyposulphite	2 „
„ sulphate	1 pound
Antimony sulphide	1 „

The dose is a tablespoonful to each 200 pounds liveweight of the pig, given once a day.

The formula is that of Dr. Salmon of the U.S. Bureau of Animal Industry.

Swine Erysipelas is due to a rod-shaped bacillus called *Bacillus erysipelatus suis*, which, when taken up by swine, gains entrance to the blood stream and sets up a septicæmia. The organism lives outside the animal body in moist and warm places, growing rapidly there; hence the disease appears most frequently in sultry, damp weather. Certain grounds and neighbourhoods are the native homes

of the organisms, and periodical outbreaks occur in these places. In the Eastern Counties of England the disease is not uncommon. The germs of the disease have been shown to be present in the tonsils and intestines of 50 per cent. of swine examined (Dr. Pitt, of Königsberg), and, to all appearances, the animals were healthy. Wild swine are said to be exempt from the complaint.

Symptoms of the disease are refusal of food, crouching in the straw, weak gait, high temperature, inflammation of the stomach, intestines, liver, spleen, kidneys, and muscles, followed by bluish-red spots as big as one's hand appearing on the belly, neck, back, and inside the thighs. There is discharge from nose and eyes, and diarrhœa. The spots then become confluent, dark bluish in colour, and death occurs. *A mild type of infection* is characterized by dark red or violet spots, livid at the edges, which raise the skin, and which is sometimes mistakenly called nettle-rash (see Fig. 59).

The bacilli are frequently found in the soil of badly drained valleys and plains, and may, as we have stated, be present in healthy swine. Pigs take up the organisms in the food, in drinking-water, in rooting about, or from other affected subjects. They may become locally, and afterwards generally, infected through the injured skin, or a breach in the mucous membrane of the digestive tract. The disease is spread by the excreta of swine, by their flesh or its washings, through butchers, dealers, and castrators.

Isolation of the diseased from the healthy, and curative and protective inoculation, are the ways this disease is combated on the Continent. A serum called "susserin," manufactured from the blood of the horse, has a large sale. The protective dose for swine from 25 to 140 lbs.

weight is from 3 to 15 c.cm. The curative dose for subjects from 110 to 330 lbs. is 10 c.cm. to 60 c.cm. The injection is made behind the ear or on the inner surface of the thigh. Although this disease is not very prevalent in this country, yet it occurs, and should be recognized when seen. In bad and virulent outbreaks treatment by serum would seem to be both scientific and profitable.

Tails Falling Off.—Several causes have been assigned for this ailment: frost-bite, irritant diarrhœa, through which the under part of the tail becomes chafed and eroded, or the acid action of the urine on the tail as it streams away, especially in sows. The supply of blood to the tail being small, and it not being a well or strongly developed organ in the pig, it is possible that defective flow of the vital fluid to the caudal appendage, lack of growth and filling out of the artery, may cause the member to wither away and drop off. A bluish-red spot may appear near the root or middle of the tail, at which place it sloughs off, or the disease may advance gradually from the end to the thickest part of the appendage. Crushing or injury may occasion it. A little vaseline rubbed on the tail may hinder the acid action of the urine.

Tetanus, or **Lockjaw,** may arise in swine. It usually affects the whole body of the animal, and upward and outward curvature of the spine may be noticed, stiff gait, and inability to feed. It is due to the tetanus bacillus, which occurs and lives outside the animal body in the earth (garden mould) and near manure-heaps. The organism may gain access to the system through a castration wound, or by a breach in the mucous membrane of the mouth (*e.g.*, when teething), or intestinal tract. The

flesh of animals that have died of tetanus should not be given to swine.

Trichinosis (see previous chapter).—Unless a pig is badly affected, small outward signs of this disease are shown. Where many trichinæ are present, the animals go about with difficulty, become stiff in the loins, show trouble in breathing and swallowing, a dropsical condition of the skin, and wasting away of the body.

Operative treatment by means of a surgical hook, taking out a piece of flesh and examining it microscopically, is one method of diagnosis practised abroad; but a pig should not be declared free from disease until fifty experiments have been undertaken.

Tuberculosis in swine is due to the tubercle bacillus. The symptoms are generally shown by digestive disturbance, colic, diarrhœa, and fever; laboured breathing and a short, dry cough follow, the animal shrinking away in condition. At times on slaughter the carcass may be fat and well nourished, yet badly affected with tubercle. The disease has a great tendency to become generalized in swine.

Living tubercle bacilli are most frequently taken up by pigs in the food, and the intestinal canal becomes invaded. Ports of entry for the organisms are the jaws, upper and lower glands of the neck; the bronchial lymphatic glands and the lungs may then become invaded. The joints and vertebræ may be seats of the disease (see Fig. 60). Milk products from consumptive cows give the disease to swine; buttermilk, skim milk, separated milk, and last, but not least, the centrifugal sediment, may all be given to pigs, and all in a not carefully supervised supply may occasion the disease. The excreta of diseased cattle and raw tuberculous flesh are other homes of the organism,

whence swine may pick up tuberculosis. Finally, an affected pig, tuberculous attendant, or tubercle-soiled food, are sources of infection. From these remarks it will be seen how easily a pig may come in contact with sources of the disease. If suspicious milk must be given to pigs, let it be thoroughly well boiled at 165° F.

Sound animals alone should be coupled, and a vigorous, strong race cultivated. A powerful constitution is better able to resist disease than a weak one. Healthy animals should be separated from diseased ones, milk products be boiled as indicated, centrifugal slime destroyed, and cattle immunized against tuberculosis (May).

Uræmia.—The symptoms of this complaint are loss of appetite, decrease in the amount of urine, a staggering gait, blood in the urine. Female animals may squat when they urinate. Coarse indigestible food, cysts or tumours in the kidney may be causes. Give a complete change of diet and mucilaginous liquids such as barley water or linseed tea. A purge of one to three ounces of sodium sulphate or Carlsbad or Rochelle salts is useful, and follow up with an electuary of boracic acid in glycerine or honey (10 to 15 grains of the boric acid per pig two or three times daily as a dose).

Worms.—A round worm, called *Ascaris suilla*, which is 3 to 6 inches long, is the commonest inhabitant of the pig's small intestine. It is parasitic in man also. Subjects affected may become weak, impoverished, and pot-bellied, not doing justice to their food. Sickness or epilepsy at times results from them. Santonin, 10 to 15 grains, may be given after fasting, followed by an aperient, and the worms watched for. The ascarides evacuated, feed the pigs liberally on nutritious food. It is important in giving worm medicine to a number of pigs

that each animal gets somewhere near the right dose. The medicine may be put up in powder form, each packet containing enough, say, for 4, 8, or 10 pigs, and mix this with milk or slop food sufficient for the desired number of pigs, then let 4, 8, or 10 pigs into the lot at a time. The strong and active pigs thus do not get the large dose, and the weak and most badly affected ones the small dose. A worm powder frequently reported to have produced a shower of parasites is made up as follows: santonin 1 part, areca nut powdered 2 parts, locust bean meal 6 parts, fine linseed meal 6 parts. Dose: a teaspoonful to a dessert-spoonful once or twice daily according to age and size of pigs.

XVII

DEMAND AND SUPPLY—GREAT BRITAIN, IRELAND, AND THE PIG TRADE

The prosperity of a country is advancing when its flocks and herds multiply and can be profitably disposed of. Unfortunately, our pig population has not shown any signs of permanent increase during the last three decades. In 1920 we had an increase of 196,000 pigs, but the conditions existing in Ireland make it probable that there are fewer pigs there. It is certain that a loss of producers is lamentable, for without them no stock can be brought forth, and an injurious disturbance or weakening of the foundation of the race means so much the less supply of home-bred pork and bacon, etc.

Fortunately, the sow is a very prolific animal, as has been indicated previously, and we must take advantage of this, and of the further fact that we send away very large sums of money every year to foreign countries for pig-meat, indicating that there is an almost unlimited demand for pork, bacon, and lard, a larger part of which we ought to supply, and a requirement far in excess of what we are satisfying or attempting to meet at the present time. How is it we do not take a greater share in the profits of pig-breeding? Is it that we are indifferent to the matter, or too unbusinesslike to compete,

even in a small measure, effectively in the market? As a primary feature there stands out beyond dispute the fact that there is a shortage of pigs in this country, and that we are not breeding enough.

Some people state that demand creates supply, and undoubtedly this is true to a certain extent; but, in the case of stock, measures must be taken to increase the number of the breeding units before progeny can become plentiful, and unless the race expands and multiplies supply will always fall short.

As regards trade, organization can accomplish much if the material be present to conduct organizing plans on. If it be lacking in plentifulness or non-existent, no great and pressing needs can be satisfied. It is said that pig-breeding operations and trade are hampered here by irksome restrictions as regards disease, that the foreigner has collared the meat market, and that no effective organization exists to bring the producer and consumer nearer together—*i.e.*, to cause organized production to deal profitably with well-planned distribution. The first of these objections is a poor one. Other countries have restrictions against disease, in some cases more severe than with us; nor can it ever be justly argued that all is well with any land where measures against infection and the spread of disease are slackly carried out or imperfectly administered. All research as to the origin of disease, sound scientific arguments as to its suppression, any number of undisputed facts bearing on its eradication, are worthy of consideration and adoption in any well-ordained community, and it is just as well at times to give those in authority credit for scientific acumen and a *bona-fide* desire to suppress infection. There is evidence to show that in connection with swine other countries have

diseases more numerous and serious, both to porcines and man, than we have here. History seems to show that as regards their incidence the foreigners make no greater progress against them than we do, and perhaps at very less economic sacrifice, and in some cases their measures to check the spread of disease have been in force longer than ours, and are even more irksome.

The second stated hindrance to expansion of our pig trade—namely, the large incursion of the foreigner into our home meat market—has a good deal of truth in it; but if he is here, and likely to remain, whose fault is it? Has there ever been any scientific attempt on our part, by co-operation or otherwise, to compete effectively in the market, or to meet the strangers with their own weapons, or, by any superior method of competition, to wrest some of the gains from them? The reasons for the lack of widespread effective competitive measures at the present time seem obvious. To start with, we cannot bring the big battalions of swine-flesh to bear on the market in order to make competition tell all at once. We have been forestalled, but the forestalling has been a gradual process. Any displacement of our competitors will have to be brought about by degrees, and we shall perhaps always be largely dependent on them; but they have far more than their share at present of our trade, and there is great room for energy, enterprise, industry, and foresight, perhaps fostered with a little fatherly care by the State to put home producers in a much better position as regards the pig-product trade. In most of the discussions as to the favourable position of the foreigner in the matter of supply the fact is lost sight of that he who produces on a large scale, regularly and steadily, can almost without exception, and especially if

all things be equal, undersell the man who puts forward small quantities irregularly, spasmodically, and which perhaps have not always been brought up in the most economical way.

The third disadvantage—viz., that the producer and consumer are not brought into close contact—is a matter for business men to rectify. If the producers be scarce and the consumers many, the position will be that of the piper calling and nobody responding to the tune, or to the one in Terpsichorean halls where wall-flowers may predominate, and the master of ceremonies be unable to remedy the position and make all parties happy.

The meat markets in this country and the men who control them must be approached in a businesslike way. If they see that their compatriots have much desirable stuff to sell, the majority of them may be trusted to buy. The tastes of the large centres of population must be consulted to a great extent, it not being forgotten that heavy and hard-cured pork is preferred in some places, light and mild in others, whilst in one or two corners abundance of tripe and trotters has much value. There is no swine-flesh that beats our own in quality and desirability, a fact indicated by our swine stock having gone all over the world to improve native races. Whoever hears nowadays of a German, French, or Italian pig coming here to impart improvement to our porcines? In some cases, no doubt, if the troubles of acclimatization could be got over, there are pigs in other countries that might be advantageously introduced here; but our own breeding stock is good enough, if its progeny can be concentrated in numbers as pork and bacon on the market. A steady and plentiful supply will prevent prices fluctuating, as they do at present, and it is by co-operation and

organization that a regular and large yield of pig-flesh can be directed towards the consumer. How, then, can supply be increased? In the first place, by breeding more animals. How can prices be kept steady, so as to make breeding pay? By co-operation, organization, and taking advantage of an adequate demand. Joining together of pig-breeders and engagement of a salesman of their own, regulation of prices according to quality, guarding against low levels, and some control of buyers, would help the suppliers. The spread of knowledge with regard to pig-breeding and the increase of small holdings will doubtless in time have the effect of producing more breeders, bringing about an addition to home-supply and the number of pigs kept. The establishment of agricultural credit banks will also aid the movement. The man with a few cows and several pigs will become more in evidence. The cottager and allotment-holder may form pig clubs to insure themselves against loss, causing the breeding of swine to be embarked on with some sense of security and encouraging it.

As an example of what may be done by co-operation, the dairy industry and bacon-curing operations of Denmark may be quoted. Twenty years ago the importation of pig products from this country to us was insignificant. To-day we take from the small State about 200,000,000 lbs. of bacon annually, at a cost to us of somewhere about £5,000,000.

Considering the millions paid by us annually to foreign countries for pork, bacon, and lard, we ought certainly to reap the advantage of some of this money in productive operations at home. The great demand for the butter of Denmark caused the farmers to look round for a profitable outlet for their waste milk. They found it in pig-breed-

ing. The enormous growth of bacon production in that country may be judged from the following facts, and this result has been obtained by the Danes through encouraging and fostering breeding and erecting bacon factories: In 1889 there were eight co-operative bacon factories in Denmark, and in 1902 twenty-seven; and in 1910 there were thirty-two, capable of treating 1,000,000 pigs annually, and realizing a revenue of £3,500,000. In 1887 the first co-operative slaughterhouse was founded; ten years later there were twenty-one such structures; and in 1908 there were thirty-three slaughterhouses, dealing with 1,549,550 pigs, 101,456 members each having an interest in one or other of these abattoirs.

It will be seen at once that unless there is a steady and constant supply of pigs to the slaughterhouses in connection with factories, these will not flourish greatly. An up-to-date bacon factory will deal with about 750 pigs a week, and cost, pre-war, about £7,000 to £8,000 to erect. The question of bacon-supply has been much discussed in this country, and a modern factory has been established at Dunmow in Essex, and another one is to be erected at Hitchin, whilst a third has been established at Elmswell, in Suffolk; that of Roscrea in Ireland has been in existence many years. In these factories all products of the pig are made use of—lard, sausages, pig's head and pig's feet, tongues, brawns, etc., being specialities. The blood, hair, and offal are all turned to profit.

There can be no doubt about the demand for pig products, and it is only a question of supplying the field scientifically, satisfactorily, and profitably. Statistics taken a few years ago showed that other countries had a good deal more swine stock in proportion to their cultivated area than we had. France had about 1 pig to

every 5 acres cultivated, Denmark 2 or more for every 11, Germany had 1 to 6, Hungary 2 to 9; but in our country we only had 1 pig to about every 15 or 16 acres cultivated.

About a year ago (1919) our pig population was 1,936,373. To be self-supporting in the matter of bacon and ham we ought to produce over 6,700,000 pigs in this country.

XVIII

THE PIG AND THE STATE

An industry involving a great source of food-supply for the nation, and in its conduct and ramifications finding employment and a means of livelihood for large numbers of the community, gains much by State aid. The best and most skilled workers become enlisted, or in time absorbed and organized, under its ægis; widely-culled, useful, informative, and exact particulars bearing on the operations in hand come under its notice; effective work and help emanate from its fold. Individual effort, however admirable and heroic, can never produce such all-round good results or such a high general standard of excellence as well directed and controlled effort, under State support, guidance, and advice.

In the matter of pig-breeding there is much room for encouragement by Government through local authorities. Men engaged in swine husbandry can then enter on their work with a greater sense of security. They can be instructed and taught as to what class of pig best suits the market and how to breed it. In some countries a fatherly interest of a practical nature is metaphorically taken by the State in the pig from its birth until it reaches the counter of the retailer. It is to be hoped that swine husbandry will receive extended help in these Isles from the resources supplied under the Development Act.

There is at present a slight measure of Government support given to pig-breeding in Ireland.

"County Committees of Agriculture, appointed by the several County Councils in Ireland, may grant premiums to a limited number of persons who undertake to keep approved boars for the service of sows the property of small farmers. The money at the disposal of the County Committees for this purpose is provided by a grant from the local rate and an equivalent contribution from the Department's Endowment Fund. In this connection it may be pointed out that the latter fund is largely a share of Ireland's proportion of what is commonly known as the 'beer and spirit' money. The portion of this fund which reaches the local authorities in Ireland is not given to them directly, but goes to them indirectly through the Department of Agriculture, and then only when the local authorities have raised a rate under the Agriculture and Technical Instruction (Ireland) Act."

The particulars of the scheme for encouraging improvement in the breeds of swine in the sister isle are herewith given. They were kindly supplied to me, along with the above-quoted information, by Mr. Gill, the Secretary of the Department of Agriculture and Technical Instruction for Ireland.

Clauses 1 to 7, inclusive, of the Department's Horse and Cattle Schemes, 1910, shall, with the necessary modifications, apply to this scheme.

SWINE.

8. The system to be adopted in connection with this scheme for encouraging improvement in the breeds of swine shall be the provision of premiums for selected boars.

9. Subject to the approval of the Department, premiums may be restricted to any one or more breeds of swine.

10. Only boars eligible for entry in the Herd-Books of their particular breeds, in the Register of Pigs of the Royal Dublin Society, or in the Register of Ulster Swine established by the

Royal Ulster Agricultural Society, shall be eligible for premiums. The owner of a boar selected for a premium must have the animal entered in the proper Herd-Book or Register, as the case may be.

11. Boars belonging to any Society or to any Association of Farmers shall be eligible to compete for premiums; but the premiums shall be paid to the Society or Association, and not to the individuals in whose charge the boars are placed.

12. A boar when selected for the first year's premium should be not less than five months nor more than twelve months old. The grant of a premium to any boar shall not be regarded as affording any right to a premium in a subsequent year.

13. The value of a premium shall be £5 for the first year, and £3 for the second year.

14. Only those boars which were awarded first-year premiums in 1909 shall be eligible for second-year premiums in 1910. All such boars must show a high degree of excellence. Two-year-old boars which show signs of having been badly cared for or are not fully developed will not be selected.

The owner of a boar selected for a second-year premium must produce evidence of the fruitfulness of the boar in the preceding year.

15. A boar which may be awarded a premium in 1910 out of funds administered by any other body shall not be eligible for a premium under this scheme.

16. (1) Boars which were awarded first-year premiums in 1909 will be inspected by the Department at places and on dates of which the owners will be duly advised by the Department.

(2) Owners of such boars failing to produce their animals for inspection on the date selected will not have their cases reconsidered.

(3) The Department will furnish the County Committee as soon as practicable with a list of boars which have been passed under this clause as eligible for premiums in 1910.

(4) The County Committee shall then proceed to select applicants for premiums for young boars. In making such selection regard shall be had to the needs of the various districts in the county, provided that no two boars shall be located in the county within three miles of each other.

(5) A boar provisionally selected for a premium under this clause must stand for service at the same place as in 1909, and, unless in exceptional circumstances approved by the Department,

the owner will not be allowed to change the premium to a yearling boar.

17. (1) The County Committee shall, by means of advertisements in the local papers or by posters, invite applications from persons who, if selected, are prepared to keep premium boars in districts not already provided for under Clause 16 of this scheme. Such applications must be made on forms to be obtained from the Secretary.

(2) As soon as a selected applicant has procured a boar which has been provisionally passed for a premium, he should notify the Secretary on a form to be obtained from the latter. The Secretary shall thereupon advise the Department on the prescribed form of the particulars as to the location, etc., of the boar, and obtain the sanction, in writing, of the Department with the least possible delay.

18. The provisional selection of boars for premiums shall be made by the Departments alone at the principal spring shows and at other places to be fixed by the Department, but no inspection for the purpose of this scheme shall be made after June 30, 1910, save in exceptional circumstances.

19. The Department, through the County Committee, will as far as practicable assist intending purchasers to secure suitable boars for the purposes of this scheme.

20. The service season for a premium boar shall not commence until the owner of the boar has notified the Secretary on the form mentioned in Clause 17 (2) that he has procured a boar. The service season for premium boars shall close finally on December 31, 1910.

21. The Secretary shall supply the owner of each premium boar under this scheme with posters, which the said owner must undertake to distribute in the district in which the boar is to serve.

22. Each first-year premium boar must serve not less than thirty sows, and each second-year boar not less than forty sows. The service fee, inclusive of all charges for this number of sows, shall not exceed 1s. for each sow. After the minimum number of sows have been served, the owner of the boar may fix such fee as he may desire.

23. The County Committee may make such regulations as they think necessary with regard—

(1) To the breed or breeds of boars to be selected,

(2) To the number of premium boars which any one applicant may possess (provided no person shall possess two premium boars unless located at least three miles from each other),

(3) To the place in which a premium boar shall remain during the season for service [see Clause 16 (5)],

(4) To requiring the owner of a premium boar not to keep any other boar on the farm on which such premium boar is located,

(5) To the penalties to be imposed upon the owner of a premium boar who fails to take proper care of the animal,

(6) To the number of sows which any one farmer may send to a premium boar under this scheme,

(7) To requiring owners of premium boars to exhibit their animals at some one of the shows subsidized by the County Committee,

(8) To requiring owners of premium boars to retain their animals in the district until September 1, 1910, and

(9) To any other matters affecting this scheme subject to the approval of the Department.

All regulations so made shall take effect as if incorporated in this scheme.

24. Each sow shall be the property of a farmer resident in the county, the aggregate tenement valuation of whose holding, or holdings, wherever situated, and for which he is rated, does not exceed the limit fixed by the County Committee.

Herds, artisans, and *bona-fide* agricultural labourers may obtain service for their sows on the same terms as a farmer.

25. The term "farmer" is to be understood to mean a person who derives his means of living mainly from farming.

26. The owner or owners of a premium boar shall not, before the stipulated number of sows have been served, reserve the use of the boar for the sows of any individual, or of the members of any Society. Subject to the provisions of Clause 29, sows must be served by a premium boar in the order in which they are presented.

27. The Department reserve the right to brand or mark premium boars, and to inspect them from time to time.

28. In the event of infringement of or non-compliance with any regulation of this scheme or of a boar being unable, from any cause, to complete the prescribed number of services, the Department reserve the right to withhold the premium, or any part of it, or in any other way to deal specially with the case, according as the circumstances may require.

29. The owner of a premium boar has the right to refuse the use of his boar in any case where he is satisfied that the service would be prejudicial to the animal. The reason for such refusal must, however, be communicated to the County Committee immediately on the refusal of the application.

30. (1) Not earlier than September 1, 1910, and not later than January 15, 1911, the owner of each premium boar shall forward to the Secretary on the prescribed form a return of the names, addresses, and valuations of the persons whose sows have been served by the premium boar, together with dates of such services at the fee named in Clause 22.

(2) The Secretary shall examine and check all such forms, and when certified by him as correct shall forward them to the Department.

(3) As soon thereafter as the Department are satisfied as to the fulfilment of the conditions of this scheme, the Secretary will be notified that payment may be made to the owner or owners of the boar of the premium, or part of the premium, payable under this scheme.

(4) Any premium not applied for on or before January 15, 1911, shall be considered as having lapsed.

31. In all cases of dispute in matters connected with this scheme the decision of the Department shall be final.

Much has been done in Germany for the advancement of the swine-breeding industry. Premiums were not only given for pure-bred, well-shaped boars, but also for sows. The money was provided partly by the State, partly by the district concerned, and in some cases was helped by money taken as fines. Stations for approved boars were established in districts where many small owners resided, and thus the stock was improved. The premiums for boars and sows varied from £3 to 30s. In many cases the markets were State controlled, and everything possible was done to keep supply regular and prices steady and profitable. Propagation work was pushed on in those districts where Chambers of Agriculture did not yet exist. Travelling missionaries in swine matters were

sent out to give instruction in pig-breeding lore, to establish boar stations, to grant premiums for deserving animals, give prizes for well-kept and well-made sties, and to help in some cases to furnish a supply of first-class breeding stock. There was an institute established for experimental therapy in the diseases of swine at Frankfort-on-Main, in the Kingdom of Prussia.

The Union of German Swine Breeders erected a school for the teaching of all matters in connection with the breeding, rearing, and feeding of pigs. The instruction was given in four sessions annually of two months each.

In Denmark swine-breeding centres are recognized by the State and receive a subsidy on the proposition of a special commission formed for this purpose. There are seven commissions of this kind, attached to a corresponding number of districts, with several breeding centres in each. Each commission is composed of three members: one who acts as President, chosen by the Minister of Agriculture; another from the agricultural society where the breeding centre is situated; and a third to represent the pig abattoir.

No breeding centre can receive a subsidy without having been previously submitted for a year to the inspection of the State commission. The animals bred must be indigenous or pure Yorkshire. All breeding centres are under the control of the Minister of Agriculture. In 1907 there were 111 breeding centres for the native races and 20 for the Yorkshires.

Since their foundation up to 1910 these centres had sold about 21,601 sows and 5,427 boars. In 1907 and 1908 they received subsidies amounting to about 63,000 francs (£2,625) from the State. The premium is given for each boar the property of a society at a recognized breeding

centre that has excelled in competition. The award amounts to about £3 a year.

The aim of the Dane has been to produce a saleable animal giving a good account of itself in the market both as to quality and quantity of flesh.

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